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Rotary offset printing press

The invention concerns a rotary offset printing press in accordance with the general terms of claim 1.

WO 03/031179 A2 discloses a printing press with print units for printing six newspaper pages alongside each other, a folder structure with two groups each of three former folders and an associated folder machine. Print unit, folder structure and folder machine can be driven by independent motors.

"Offsetdrucktechnik" [Offset Printing Technique] by H. Teschner, Fachschriftenverlag GmbH & Co. KG, 1995, discloses on page 10/32 in Figure 6 a nine-cylinder satellite offset tower, on which is arranged a three-cylinder Colordeck for 4/1 printing.

DE 25 28 008 A1 shows a printing press for a direct printing method with form cylinders that can be assembled axially with six and around the circumference with two printing plates and impression cylinders that can be covered axially with three blankets and around the circumference with one. Both the printing plates arranged alongside each other and the

blankets arranged alongside each other are in each case arranged offset to each other around the circumference.

DE 25 10 057 A1 also discloses a printing press with direct printing method, whereby the form cylinder interacting with an impression cylinder carries over its width six and around the circumference two printing plates.

Through JP 56-021860 is known an offset tower with form, transfer and impression cylinders, each of the three cylinders being driven by its own drive motor.

Through DE 41 28 797 A1 is known a triple width rotary offset printing press, whereby longitudinally folded ribbons can run into a folder machine in two pairs each with a flap fold cylinder and a cutter cylinder.

From "Newspapers & Technology", December 2000 is known a printing press with offset towers the width of six newspaper pages. The offset towers are formed as bridge offset towers, the transfer cylinders being clad with blankets.

WO 01/70608 A1 discloses a turner bar arrangement, whereby two essentially partial web-width turner bars are each arranged movably on a mount transversely to the incoming partial web. In each case at the side and outside the side frame is arranged a table roll, the

longitudinal axis of which runs essentially parallel to the side frame and which also can be moved along a rail in a direction crosswise to the incoming partial web.

From US 4 671 501 A is known a fold assembly, where two formers are arranged one above the other, whereby the webs after passing through rise rollers are cut longitudinally before a third former, the partial webs are turned through 90° via a third former and then gathered together in two ribbons are fed to the two formers arranged one above the other.

Through EP 1 072 551 A2 is known a folder machine with two groups of formers vertically offset against each other. Above each group of formers is a harp, i.e. a group of collecting, take-off or even harp rollers, via which the partial webs concerned are fed to the assigned group of formers.

In WO 97/17200 A2 is known a fold assembly, where trimmed partial webs offset crosswise to each other are fed to different formers. The formers arranged horizontally close to each other are in part vertically offset to each other.

DE 44 19 217 A1 shows a superstructure of a web-fed rotary printing press with a turn unit, whereby partial webs are offset by half a partial web width in order to run them one above the other and feed them to a common former.

Through DE 43 44 620 A1 is known a folder machine with a five-section or even seven-section transport cylinder, which operates in conjunction with a cutter cylinder with two knives.

Through DE 44 26 987 A1 is known a seven-section transport cylinder arranged as a perforating cylinder.

EP 1 391 411 A1 makes known a folder machine, whereby a product section to be perforated is pressed against the transport cylinder by a soft-faced pressure roller.

DE 33 03 628 C2 makes known a cutter cylinder which operates in conjunction with a counter-pressure cylinder for web-form product, which in one format has six, and in another format has three knives in succession around its circumference.

Through US 5,503,379 is known a folder machine with double width folder and double width cutter cylinders, whereby two cutters can be arranged axially alongside each other on a double width cylinder.

The invention is based on the requirement for creation of a rotary offset printing press.

The requirement is satisfied by the features of claim 1.

The advantages achievable with the invention comprise in particular in that a rotary offset printing press with a folder machine for a high output is created, in particular together with a triple width printing press, for reliable operation.

Advantageously a transport cylinder with a large circumference is provided, allowing a correspondingly large number of steps (cutting, clamping, folding) to be performed reliably at high production speeds. Another advantage is that the large radius of curvature markedly reduces the obliqueness of the cut edge of the product, which is particularly beneficial for thicker products.

In an advantageous version the folder machine has a cutter cylinder with four cutter knives around the circumference, i.e. it has a circumference of four section lengths. In a very advantageous arrangement – in particular in conjunction with the above-mentioned printing presses – the 4-section cutter cylinder and/or the pressure element (e.g. pressure roller) is combined with a 7-section transport cylinder. For versions of the folder machine with 4-section cutter cylinders this can be arranged either as a perforating cylinder or as a gripper cylinder.

The advantage of a cutter cylinder with four knives in succession around the circumference compared to two knives lies in the geometry which allows a much reduced tilting of the cutter

knife in the groove slots. The four cutter knives and four section lengths (signatures) around the circumference of the cutter cylinder ("cutter cylinder with four length circumference") allow the use of much larger bearings, a large spigot and/or a more robust design of the body of the cylinder itself, which contributes to improving the stability. This allows thicker products (more layers) to be cut, since a greater force can be applied. For lesser product thicknesses the reduction in twist and bend leads to improved accuracy of cutting.

In another advantageous version or extension of the above mentioned version the folder machine has a pressure element, in particular a pressure cylinder, which acts as a backing pad to the perforation pins when perforating a ribbon (or ribbon bundle). The use of a pressure element is particularly advantageous when the transport cylinder takes the form of a perforating cylinder.

In an advantageous version the folder machine constitutes an extension to this, optionally in collating mode whereby several product sections are taken on to the transport cylinder in the course of more than one revolution before releasing the stacked piles to the following cylinder, in particular a flap fold cylinder - and also in non-collating mode - releasing the product sections at the first passage through the transfer point between transport- and flap fold cylinder.

The above versions of the folder machines are in particular advantageous in connection with

products with large numbers of pages. An advantageous printing press has printing machines with a printing cylinder width allowing printing of six newspaper pages alongside each other and one of the above mentioned folder machines above it. The form cylinders of the printing machines have then a length sufficient to carry one or more print forms with in total six newspaper pages alongside each other – e.g. in broadsheet format. The folder machine has here for instance a folder structure with three former folders alongside each other transversely to the direction of running of the webs, with transversely arranged former folders ahead of them.

Similar advantages are obtained also for a printing press in which multiple, e.g. six or more part webs are collected together before the folder machine into a ribbon to be folded.

Further advantages accrue to versions in particular for printing presses with higher production speeds, i.e. high speed printing machine for paper speeds for instance 12 m/s and more.

Advantages are obtained in particular in that production reliability is significantly increased for a triple-width printing machine compared to a double width printing machine with the same design thickness of product. Alternatively whilst retaining the same number of printing machines the output of the printing press and of each printing machine can be increased by 50%.

The number of splicers (investment), the frequency of reel change (reliability of production) and the set-up time when webbing up (cycle times) can be reduced compared with a double-width printing press for the same product thickness.

In an advantageous performance the offset towers are executed as nine-cylinder satellite offset towers, which results firstly in great precision in the ink register and secondly a low-vibration design. Vibrations are also reduced by the advantageous arrangement, execution and attachment of coverings on the cylinders. For one thing openings in the jacket surface are minimized circumferentially. Furthermore, at least on the transfer cylinder can be arranged offset alternately around the circumference so that at least for one section length a closed jacket surface is always interacting with the form or satellite cylinder. Thirdly circularity errors and production costs are minimized in that though axial through-channels are provided for the barrel over its whole effective length, there are openings through to the jacket surface only in the said sections. Then e.g. devices fastening covering ends and/or linings are optionally inserted.

In each case at least six devices for the axial positioning of printing forms are arranged in the channels of the form cylinders. These are e.g. executed as register pins acting together positively with printing form ends, the pins being able to be moved within the channel manually or by remote control.

An advantage in respect of the fitting of form cylinders with printing forms that can be reproduced precisely in register is the version of offset towers with assigned pressing devices. With these blankets on the jacket surface of the cylinder can be fixed as needed by at least one pressing element, while an end of a blanket or several blankets is released for removal or for fitting.

The drive independent mechanically of the cylinder pairs of the satellite cylinder(s) involves in particular advantages in respect of the possibility of variable operation. Thus, for example, a set-up, e.g. an on-the-fly change of printing form or a wash-up, can take place during production. Conversely a web can be drawn in, while other cylinders or cylinder pairs are stopped or a set-up program is running. It is also an advantage when there are blankets with positive or negative conveying properties to operate the satellite cylinder at a surface speed different from the other cylinders.

In an advantageous version a superstructure of the printing press has at least one slitting device with at least five knives spaced crosswise to the paper flow direction. In an advantageous version there are for each print tower (or every eight printing points) two register devices movable transversely to the paper flow direction to compensate for runs of the partial webs. These can in a further development each be structurally combined with a partial web-wide turning device. Also subsequent guide elements assigned merely to partial webs are e.g. essentially designed merely the width of the partial web. These versions allow

a low-vibration, and hence again precise transport of the web. Fluctuations in web tension caused by inertia of long, thick guide elements driven only on the partial web(s) (in the case of e.g. changes of load, change of printing speed) can be effectively reduced.

As regards reliable operation and cost-saving design it is also an advantage to provide in the superstructure the possibility of turning a partial web through an uneven multiple of a half partial web. This dispenses with drawing in and printing partial webs with a half former width (e.g. a newspaper page).

As regards costs and space-saving design it is an advantage in one version to assign a so-called harp, i.e. normally several undriven rise rollers, merely to one of two superimposed formers. Webs can be transferred from the harp to the other former. Ribbons of variable thickness or number of partial webs can be fed to the formers arranged vertically above each other from the same line of partial webs lying above each other.

In one version partial webs can be admitted from a harp assigned to one group of formers to another former group and vice versa. In an advantageous version one so-called harp, i.e. several undriven rise rollers (also called collecting or take-off rollers) in line, is to be assigned merely to one of two superimposed formers. Webs can then be transferred from the common harp to the other former. Ribbons of variable thickness or number of partial

webs can be fed to the formers arranged vertically above each other from the same line of partial webs lying above each other.

In an advantageous version of a turn unit the partial web can be or is moved merely through an uneven multiple of a half partial web width. It can thus e.g. with very little expense be avoided having to print very narrow webs or provide additional offset towers. The version movable crosswise to the web of at least one of the turner bars makes for great variability.

The drive of rollers of the former superstructure and/or of the folder, independent mechanically of the offset towers, is advantageous in particular as regards good registration and variable operation.

With the six cylinder tower and the web paths there are advantages in particular in that a great variety of product can be achieved and a flexible and exact drive is possible in conjunction with the said drive situations.

Practical examples of the invention are shown in the drawings and are described in more detail in the following.

The following Figures show:

Fig. 1 a side view of a web-fed rotary printing press

Fig. 2 a diagrammatic front view of an offset tower

Fig. 3 a diagrammatic top view of an offset tower

Fig. 4 exploded view of a covering

Fig.5 a form cylinder; a: exploded view, b: in longitudinal section, c: a support element, d: a support element with register device

Fig. 6 a transfer cylinder; a: exploded view, b: in longitudinal section, c: a support element, d: a filling piece

Fig. 7 a device for pressing a covering onto a cylinder

Fig. 8 a first practical example for the drive of a nine-cylinder satellite offset tower

Fig. 9 a second practical example for the drive of a nine-cylinder satellite offset tower

Fig. 10 a third practical example for the drive of a nine-cylinder satellite offset tower

Fig. 11 a form of execution of the practical example as in Fig. 8

Fig. 12 a general arrangement of a superstructure

Fig. 13 a first practical example of a register device

Fig. 14 a second practical example of a register device

Fig. 15 an example for a web turn

Fig. 16 a front view of the harp with turned web as in Fig. 15

Fig. 17 a folder assembly of a web-fed rotary printing press

Fig. 18 a side view of the folder structure with web path

Fig. 19 a front view of the folder structure with web path

Fig. 20 a diagrammatic side view of the folder machine

Fig. 21 a diagrammatic side view of a second version of the folder machine with four-page cutter cylinder

Fig. 22 a variant of the folder machine as Fig. 21 but with a pressure cylinder

Fig. 23 a diagrammatic cross-section of a pressure cylinder

Fig. 24 a variant of the folder machine as Fig. 20 but with a pressure cylinder

Fig. 25 a first web path / a first practical example

Fig. 26 a second web path / a second practical example

Fig. 27 a third web path / a third practical example

Fig. 28 a fourth web path / a fourth practical example

Fig. 29 a fifth web path / a fifth practical example

The web-fed rotary printing press shown by way of example in Fig. 1 has a left-hand and a right-hand section each with at least two printing towers 01. The printing towers 01 has print units 02, which e.g. are made at least with a threefold width, i.e. for printing at a time six newspaper pages arranged alongside each other axially. The print units 02 are made as satellite print units 02. The advantageous execution of the print units 02 as nine-cylinder satellite print units 02 guarantees very good registration and low fan-out. The print units 02, however, can also be made as ten-cylinder satellite print units 02 or possibly also as print units that can be operated in blanket-to-blanket printing, like e.g. several bridge print units or an H-print unit 02. Webs 03 are fed to the print units 02 from reels that are not shown, in particular using splicers.

Downstream from a web 03 passing through the printing towers 01 or print units 02, here above the printing towers 01, a superstructure 04 is provided for each section, in which the web 03 or webs 03 can be cut at slitters, partial webs can be possibly transferred and/or converged by turning devices 07, can be aligned with each other and run one above the other by means of register units 08 in the longitudinal register 08 merely indicated in Fig. 1. Downstream in the direction of web travel the superstructure 04 has at least one so-called harp 09 with a number of harp or rise rollers arranged one above the other and carrying the webs 03 or partial webs 03a, 03b, 03c. The harp 09 determines the former infeed of the webs being run one above the other. Via this harp 09 the webs 03 undergo a change of

direction and are then gathered together either as a ribbon or as several ribbons and fed to at least one folder assembly 11.

In the example two folder assemblies 11 are arranged between the sections, which e.g. have formers arranged in each case on two different levels one above the other. The printing press, however, can also have merely one joint folder assembly 11 arranged between the sections, or merely one section and an assigned folder assembly 11. Also the respective folder assembly 11 can be executed with only one level of formers. One or more folders 12 are assigned to each folder assembly 11.

The print unit 02 has several, in the example four, printing groups 13, by means of which ink can be applied to the web 03 from an inking system 14 via at least one cylinder 16 executed as form cylinder 16 (Fig. 2). In this example of execution of the print unit 02 as satellite print unit 02 the printing group 13 is executed as an offset tower 13 for wet offset and has in addition to the inking system 14 a dampening system 20 and another cylinder 17 executed as transfer cylinder 17. The transfer cylinder 17 forms with a printing cylinder 18 forming an abutment a printing point. In the example in Fig. 1 the printing cylinder 18 is executed as a satellite cylinder 18, which with further transfer cylinders 17 of further printing groups 13 forms further printing points in Print On position. The printing cylinder 18 could also be executed as transfer cylinder 18 when making the printing groups a double printing group in blanket-to-blanket printing. The same parts are given the same references, unless

necessary for distinguishing. There may though be a difference in position, which is normally disregarded when assigning same references.

The inking system 14 has in an advantageous execution an ink fountain 15 extending over six printed pages. In another version are arranged axially alongside each other three ink fountains 15 alongside each other axially each about two printed pages wide. The dampening system 20 is in an advantageous version executed as four-roller spray moistening system 20.

The form cylinder 16 has in a first execution e.g. a circumference between 850 and 1000 mm, in particular from 900 to 940 mm. The circumference is designed e.g. to take two portrait printed pages, e.g. newspaper pages in broadsheet format, using two coverings 19, e.g. flexible printing forms 19, that can be fixed one after the other circumferentially on the form cylinder 16. The printing forms 19 can be mounted circumferentially on the form cylinder 16 and in the execution shown in Fig. 3 each can be individually replaced individually with a single printing plate with a printed page axially.

The length L16 of the usable barrel of the form cylinder 16 is in the first version e.g. 1850 to 2400 mm, in particular 1900 to 2300 mm, and is dimensioned to take e.g. at least six portrait printed pages arranged alongside each other, in particular newspaper pages in broadsheet format (see Fig. 3, sections A to F). It depends among other things on the nature of the

product to be produced whether only one printed page or several printed pages are arranged axially alongside each other on a chasing form 19. In an advantageous wider variant of the first version the length L16 of the usable barrel is between 2000 and 2400 mm.

In a second version the form cylinder 16 has e.g. a circumference between 980 and 1300 mm, in particular from 1000 to 1200 mm. The length L16 of the usable barrel here is e.g. 1950 to 2400 mm, in particular 2000 to 2400 mm. The configuration is as the above-mentioned version.

The transfer cylinder 17 has in the first version also a circumference e.g. between 850 and 1000 mm, in particular from 900 to 940 mm. The length L17 of the usable barrel of the transfer cylinder 17 is in the first version e.g.1850 to 2400 mm, in particular 1900 to 2300 mm, and has longitudinally alongside each other e.g. three coverings 21, e.g. blankets 21 (sections AB to EF). They range circumferentially essentially around the whole circumference. The blankets 21, favourably influencing the vibration behaviour of the printing group 13 in operation, are arranged alternating offset to each other e.g. by 180° (Fig. 3). In the wider variant of the first version the length L17 of the usable barrel is similarly between 2000 and 2400 mm.

In the second version the transfer cylinder 17 has e.g. a circumference between 980 and 1300 mm, in particular from 1000 to 1200 mm. The length L17 of the usable barrel is here

e.g. 1950 to 2400 mm, in particular 2000 to 2400 mm. The arrangement of coverings 21 is the same as the first version.

Diameters of barrels of cylinders 16, 17 in the first above-mentioned version are e.g. from 270 to 320 mm, in particular from about 285 to 300 mm. In the second above-mentioned version the diameter of barrels of cylinders 16, 17 is e.g. from about 310 to 410 mm, in particular from 320 to about 380 mm. A ratio of length of the usable barrel of cylinders 16, 17 to their diameter should be 5.8 to 8.8, e.g. 6.3 to 8.0, in the wide version in particular 6.5 to 8.0.

As length L16, L17 of the usable barrel is to be understood here the width or length of the barrel, which is suitable for taking coverings 19, 21. This is the same roughly also of a maximum possible web width of a web 03 to be printed. In relation to an overall length of the barrel of cylinders 16, 17 there should still be added to this length L16, L17 of the usable barrel also the width of any bearers, of any keyways and/or of any jacket surface areas, which e.g. have to be accessible for the operation of tensioning or clamping devices.

In an advantageous version the satellite cylinder 18 similarly has essentially the said dimensions and ratios at least of the assigned transfer cylinder 17.

Coverings 19, 21 are as shown diagrammatically in Fig. 4 are executed e.g. as flexible plates, whereby the covering executed as blanket 21 is executed as a so-called metal blanket with an elastic and/or compressible layer 22 (line of dashes) arranged on a bearer plate (in Fig. 4 the references concerning only the metal blanket 21 are shown with dashed lines). A plate-shaped chasing form 19 or a bearer plate 23 for a blanket consists normally of a flexible, but otherwise dimensionally stable material, e.g. of an aluminium alloy, and has two opposite ends 24, 26 to be fastened in or on the cylinder 16, 17 with a material thickness MS of e.g. 0.2 mm to 0.4 mm, preferably 0.3 mm, these ends being folded to be formed as plating grip 24, 26 each along a bending line in relation to the extended length l of the covering 19, 21 by an angle α, β between 40° and 140°, preferably 45°, 90° or 135° (Fig. 4). A leading end 24 is for example folded at an acute angle α of 40° to 50°, in particular 45°, and a trailing end 26 at an angle β of 80° to 100°, in particular 90°. If only a single cover 21 is applied to the circumference of the cylinder 16, 17, in particular of the transfer cylinder 17, the length l of the cover 21 is almost the circumference of this cylinder 17.

Basically the folded ends 24, 26 of the covers 19, 21 can each now be inserted into a slotted opening parallel to the longitudinal axis, the ends for example being held by their shaping, friction or deformation. However, they can also be fixed by means of spring force, by pressure or a centrifugal force of something that can be actuated and effective during operation. The slotted openings for printing plates 19 on the form cylinder 16 arranged axially alongside each other are in an advantageous version each arranged in a row, e.g. as

a continuous slotted opening (as described below), while the openings for the blankets 21 arranged alongside each other on the transfer cylinder are not continuous, but offset to each other alternating by 180° circumferentially.

Figs. 5a and 5b show in exploded view an example of an advantageous view of the form cylinder 16. In cylinder 16 are provided two channels 27, the two channels 27 extending axially through the cylinder 16 at least through the entire length of the six sections A to F in the barrel (Fig. 5b). They are arranged offset to each other, e.g. by 180°, around the circumference of the cylinder 16. The channels 27 executed beneath a jacket surface 30 inside the cylinder 16, e.g. as circular holes, have a narrow slotted opening 28 to the jacket surface 30 of the cylinder 16 at least over the length of the six sections A to F (Fig. 5a). A slot width s16 of opening 28 or the form cylinder 16 is less than 5 mm circumferentially and is preferably in the range 1 mm to 4 mm (Fig. 5c).

The folded ends 24, 26 of chasing form 19 can now each be inserted in one of the openings 28 parallel to the axis longitudinally around the circumference and can be fixed, at least the trailing end 26, by a retainer device 29, 31 arranged in the channel 27.

The retainer device 29, 31 has here at least one clamping piece 29 and a spring element 31 (Fig. 5c). The trailing plating grip 26 folded at a right angle not shown here (see Fig. 4) comes to rest preferably on a side of the opening 28 of essentially complementary shape

and is pressed down there by a clamping piece 29 by a spring element 31 on the clamping piece 29. The leading end 24 of the clamping plate folded at an acute angle and not shown (see Fig. 4) comes to rest preferably against a side of opening 28 of essentially complementary shape for the fold, which with jacket surface 30 forms an insertion edge or nose at an acute angle α' of 40° to 50°, in particular 45°. There is an actuator 32 in the channel 27 for loosening the clamping of the trailing end 26, which on activation counters the force exerted by the spring element 31 on the clamping piece 29 and swivels the clamping piece 29 away from the side or the end 26.

In an advantageous version there is not only one clamping piece 29 in each channel 27, but several clamping pieces 29 in the nature of segments each with at least one spring element 31 are arranged axially alongside each other over the length of sections A to F (in Fig. 5a shown "drawn out" of the cylinder 16). In the practical example there are several, e.g. six, such clamping pieces 29

In the practical example for each section A thro F there are several, e.g. six, such clamping pieces 29 arranged as shown in fig. 5c, whereby a register block 35 with a register element

33 (fig. 5d) is located centrally between the clamping elements 29 of each of the sections A thro F, in this case between the third and fourth clamping element 29 of each of the section A thro F. The register block 35 / register pin 35 is manually moveable and adjustable within an arrangement such as a groove in a base 34. In a further development (not shown) the register block 35 can also be moved axially in a space of channel 27, which remains free, or in the activation direction of the register element 33, for instance with a motorised threaded spindle.

The actuating mechanism 32 is implemented in the arrangement shown, such that when actuating the clamping element(s) (29, 31), i.e. all the clamping elements 29 over the length of sections A thro F are simultaneously closed or released. The actuating mechanism 32 is shown "extracted" from cylinder 16 as shown in fig. 5a for at least the length of sections A thro F axially along channel 27 and with the reversibly deformable hollow body 32 (e.g. as hose 32) for use in conjunction with a pressure device. This hose 32 is arranged as shown in fig. 5c together with clamping pieces 29 of that type, which operate together in channel 27, so that when actuated it acts against the fail-safe force of spring elements 31 which hold the retaining elements in the closed position. It runs through the region of the register elements 33 (fig. 5d).

Figs. 6a and 6b show an isometric view of an example of an advantageous arrangement of the transfer cylinder 17. Two channels 36 and 37 are provided within the cylinder 17, and

both channels 36 and 37 run through the axial length of cylinder 17, at least over the entire length of the six sections A thro F / the three sections AB; CD; EF in the assembly (fig. 6b). They are spaced around the circumference of cylinder 17 for example by 180° from each other.

Channels 36 and 37 are typically two circular drilled holes, both lying underneath the outer circumference 40 within cylinder 17, being in total typically three, in each case running axially, for at least the length of section AB; CD; EF. Sufficiently narrow slotted openings 38; 39; 41 provide an opening to the outer circumference 40 of cylinder 17 (fig. 6a). Two of the three openings 38; 39 connect to the same channel 36 and are axially in line with each other, but axially apart from each other on the outer circumference 40. Axially between the two openings 38; 39 there exists a continuous surface of the outer circumference 40. in particular the unmachined section U in which there is no opening. The two openings 38; 39 that are in line with each other, are both for instance in communication with the same channel 36 are preferably the openings 38; 39 near to the end faces of the cylinder, whereby the third opening 41 extends axially only to the extent of the centre section CD and is 180° displaced relative to the other openings 38; 39. The slot width s17 of the uncovered openings 38; 39; 41 on the transfer cylinder 17 in the direction of the outer circumference is always less than 5 mm wide, and preferably should lie in the range 1 mm to 3mm (fig. 6c). For manufacturing reasons one or both of the ends of the slots 38; 39; 41 be arranged as radial run-outs to the drilled holes 42; which under operating conditions for cylinder 17 can

be or are sealed with a plug (not shown) (fig. 6b). The plug when fitted will exhibit an outer face that forms a continuation of the otherwise cylindrical outer contour of the cylinder 17 in the region of the drilled hole 42. In an advantageous arrangement a vertical cut in the circumference of cylinder 17 is made perpendicular to the axis of rotation axis is made at just one of the openings 38; 39; 41 or at one of the openings 38; 39; 41 that has been terminated with a plug. This cut should not be considered as overlapping the openings 38; 39; 41 or the openings 38; 39; 41 where they are terminated with a plug.

The bevelled ends 24; 26 of the rubber blanket 21 can now each be tucked into one of the openings 38; 39; 41 in the circumference parallel to the axis, and can be secured, at least the trailing end 26 each at least by one of the clamping pieces 43; 44 arranged in each of channels 36; 37. It is advantageous that both ends 24; 26 of the same rubber blanket 21 are fed through the same opening 38; 39; 41 in the same channel 36; 37.

The retaining devices 43; 44 each here each exhibit at least one clamping piece 43; 44 and a spring element 44 (fig. 6c). The square bevelled trailing locating arm 26 (see fig. 4) (not shown) is mounted advantageously on one of the bevels essentially forming a complementary side wall to openings 38; 39; 41 and is there held in place by clamping piece 43 due to the force exerted by spring element 44 on clamping piece 43. The acute-angled bevelled leading locating arm 24 (see fig. 4) (not shown) is fitted advantageously on one of the bevels essentially forming a complementary side wall to openings 38; 39; 41, which with

the outer circumference 40 forms an attachment edge or nose with an acute angle α of 40° to 50°; in particular 45° to the assembly. To release the clamp of the trailing end 26 at least one actuating mechanism 46; 47; 48 is provided in channel 36; 37, which when activated acts against the force exerted by spring element 44 on the clamping piece 43 in the opposite direction and the clamping piece 43 is swung away from the line of the wall. In an advantageous arrangement of this type at least one actuating mechanism 46; 47; 48 is provided for each of the three openings 38; 39; 41 in each of the associated channels 36; 37 (in fig. 6a shown "extracted" from the cylinder 17).

In an advantageous arrangement in each channel 36; 37 not only a clamping piece 43 but also several clamping pieces 43 axially alongside each other along the length of sections AB; CD; EF can be arranged as individual segments each with at least one spring element 44 (in fig. 6a shown "extracted" from the cylinder 17). In the arrangement example each section AB; CD; EF and each opening 38; 39; 41 there are several, e.g. ten, of this type of clamping piece 43 as shown in fig. 6c. In sections AB; CD; EF of each channel 36; 37 which have no opening to the outer face of the outer circumference 40, instead of the retaining device 43, 44 or the retaining devices 43, 44 there is at least one filler element 49 (fig. 6d) in channel 36; 37. In the example there are several, e.g. eleven, of there filler elements 49 as individual segments in the respective places on sections AB; CD; EF of channels 36; 37 with no opening to the outer face of the outer circumference 40. A filler element 49 (fig. 6d) can also be arranged centrally between the retaining devices 43, 44 of each section AB; CD; EF,

i.e. in the area between sections A and B, and E and F, here between the fifth and sixth clamping element 43. The filler element 49 exhibits essentially a cross-section that mimics the cross-section of the channel 36; 37 and at least one through opening 51 in the axial sense, through which the activating medium for the actuating mechanism 46; 47; 48 can pass.

The actuating mechanism 46; 47; 48 in the arrangement shown is arranged so that the activation of the retaining device 43, 44 for a section AB; CD; EF causes all the clamping pieces 43 of a section AB; CD; EF to be closed or released simultaneously. The actuating mechanism 46; 47; 48 is in fig. 6a shown "extracted" from the cylinder 17. In channel 36 (with two openings 38; 39) an actuating mechanism 46; 47 extends from each end face over at least the respective length of the section AB; EF. The actuating mechanism 48 for the centre opening 41 extends also for at least the respective length of the section CD. It can extend however also on at least one side up to the end face of cylinder 17, if this is advantageous for feeding the activating media (fig. 6a). The actuating mechanisms 46; 47; 48 run in each case axially in channel 36; 37 and can be activated with compressed media within reversibly deformable hollow bodies 46; 47; 48, e.g. a hose 46; 47; 48. This hose 46; 47; 48 is arranged as shown in fig. 6c with the clamping piece 43 of that type operating together in channel 36; 37, which when activated acts against the force exerted by spring element 44 on the clamping piece 43 in the opposite direction. This of fed through the area of suitable filler elements 49 and through the opening 51 (fig. 6d).

In a different version of channels 36; 37 also need not each extend over the entire length . So for example in the region of the sections AB; CD; EF each channel 36; 37 can as necessary be provided with a respective retaining device, so that channel 37 with the centre blanket 21 is displaced by 180° compared to the two outer ones. This is shown in an outline schematic fashion in fig. 6e.

In an arrangement that is particularly advantageous for printing using an offset tower 02 and cylinders 16; 17 six page widths wide, at least two cylinders 16; 17, in particular two form cylinders 16, in at least one print tower 01 there is arranged a device 52 for pulling a proof from a blanket 19; 21 on a cylinder 16; 17, in particular a print former on the form cylinder 16 (in the following proof-pulling device 52). This is advantageous for instance if in two corresponding printing machines 13 a quick, e.g. flying plate change is to be performed. In particular it is advantageous for a quick, reliable and precise change of product if one of these types of proof-pulling device 52 is provided for all the form cylinders 16 of a print tower 01. A corresponding proof-pulling device 52 exhibits one or more proof-pulling elements 53; 54, such as bars, push rods or roller elements 53; 54, which can be attached optionally to one or more blankets 19; 21. This allows a controlled and smooth take-up / tensioning and / or release or removal of the blanket 19; 21. It also enables that an end 24; 26 of the blanket 19; 21 can be inserted into the respective channel 27; 36; 37 and the opening 28; 38; 39; 41, or the partially released blanket 19; 21 held down in the desired position. The proof-pulling

device 52 extends lengthwise along the cylinder 16; 17 at least in the same region as sections A thro F, i.e. the range of the assembly effective for printing.

The design of the proof-pulling device 52 described in fig. 7 is particularly advantageous also in connection with the common actuating mechanism 32 arrangement extending over all section A thro F. In this constellation a single or group loading, changing and / or removal of printing formers 19 can be performed, even for six formers alongside each other on a form cylinder 16, without requiring a lot of work for the actuator devices or operating material feed within the form cylinder 16. Production, installation and maintenance are all significantly simplified.

The proof-pulling device 52 exhibits for each section A thro F (for up to six adjoining blankets 21) or for sections AB; CD; EF (for up to three adjoining blankets 21) at least a first proof-pulling element 53 e.g. roller element 53. In an advantageous arrangement as shown in fig. 7 it exhibits for each section A thro F or for sections AB; CD; EF a second proof-pulling element 54, spaced circumferentially around the cylinder 16; 17 apart from this first roller element 53. In fig. 7 for the case of the form cylinder 16, only the centre sections B, C, and D and the roller elements 53; 54 associated with these centre sections B, C, and D are shown. For each section A thro F and for AB thro EF there are arranged a first roller element 53 or a group of roller elements 53 arranged alongside in the axial sense and also a second roller element 54 or a group of roller elements 54 arranged alongside in the axial

sense. In the example for each section A thro F and for AB thro EF there are shown a first roller element 53 and a group of three second roller elements 54. Advantageously in view of the risk of possible tipping and thus an incorrect axial alignment, the arrangement of groups should be that there are at least two roller elements 53; 54 which can be moved independently of each other. A single roller element 53; 54 for a section A thro F or for AB thro EF is for example positioned in the longitudinal sense, extending almost to the length of the roller 53; 54 for the section A thro F or AB thro EF; a roller element 53; 54 of a group in contrast extends merely at the most of the fraction of the length of the roller 53; 54 for the section A thro F or AB thro EF.

The roller elements 53; 54 are arranged axially alongside each other, and the roller elements 53; 54 if provided lie behind them in a circumferential sense. These can always be moved independently of each other on for instance a traverse 56 (or several traverses 56). The single first roller element 53 or a group of first roller elements 53 of each one of section A thro F or AB thro EF, and also, where provided, the single second roller element 54 or a group of second roller elements 54 of each one of section A thro F or AB thro EF can be activated independently of each other by means of their own actuating mechanism 57; 58. These actuating mechanisms 57; 58 function through the reversibly deformable hollow body 57; 58 (in particular as hose 32) pressure device. However also other types of actuating mechanisms that are electrically or magnetically actuated can also be used.

For clamping a blanket 16; 17 into a section A thro F or AB thro EF, th leading acute angle bevelled end 24 of the blanket 16; 17 is fed into the opening 28; 38; 39; 41. The first roller element 53 for this section A thro F or AB thro EF, and, if provided, the second roller element 54 for this section A thro F or AB thro EF is placed on the cylinder 16; 17 or on the previously tensioned and located blanket 19; 21. If already one or more further blankets 19; 21 are mounted on the cylinder 16; 17 and it is desired to keep them there, than also the first and / or second roller elements 53; 54 for these sections A thro F or AB thro EF should be placed on the respective blankets 19; 21. If the first and second roller elements 53; 54 are provided, when the cylinder 16; 17 with roller elements 53; 54 starts to rotate, the second roller element 54 will push the trailing bevelled end 26 of the blanket into the opening 28; 38; 39; 41 as it rolls over it. If only the first roller elements 53 are fitted, then these perform the pressing down. It is advantageous that the roller elements 53; 54 remain fixed in place for this, whilst cylinder 16; 17 rotates in the production sense P. The retaining devices previously placed in the release position (open) for sections A thro F or AB thro EF, such as one or more clamping pieces 29; 43 change to their hold or retaining position (closed). After the retaining devices have changed from the release position to their retaining position, all the roller elements 53; 54 of the respective section A thro F or AB thro EF of cylinder 16; 17 and its blanket 19; 21 are switched off.

On relaxing a blanket 19; 21 it must be taken into account whether one or more other blankets 19; 21 should remain on the cylinder 16; 17. In this first case at least one of the

roller elements 53; 54 associated with the blankets 19; 21 that are to remain should be clamped or remain clamped in the region of the trailing end 26 or near the opening 28; 38; 39; 41. The roller elements 53; 54 associated with the blankets 19; 21 that are to be released should be unclamped or remain unclamped. The retaining devices for sections A thro F or AB thro EF are opened. The trailing end 26 of the blanket 19; 21 to be removed is ejected by its own spring force from the channel 27; 36; 37, whilst the blankets 19; 21 to be retained are held down by roller elements 53; 54. The retaining device is then closed again. If the actuating mechanism is fitted with both first and second roller elements 53; 54, the blankets 19; 21 to be retained are advantageously held down by at least the second roller elements 54. For the blankets 19; 21 to be removed, if the actuating mechanism is fitted with both first and second roller elements 53; 54 then firstly at least the second roller element 54 should be switched off, so that the end 26 can escape from the channel 27; 36; 37, and the first roller element 54 should be switched on, so that the already partially released blanket 19; 21 is still guided and held by cylinder 16; 21.

Then the cylinder 16; 17can advantageously be rotated counter to the sense of production rotation P, until the leading end 24 is ejected from the channel 27; 36; 37, and the blanket 19; 21 can be removed. If when the blanket 19; 21 is released no remaining blankets 19; 21 require consideration, then the roller elements 53; 54 of the blankets 19; 21 for sections A thro F or AB thro EF that are not to be released can be taken during the procedure in principle at any operating position, preferably switched off.

At least one proof-pulling element 53; 54 can thus be secured as required to blankets 19; 21 that are positioned on the outer circumference 30; 40 of cylinder 16; 17, whilst an end 24; 26 of a blanket 19; 21 or several blankets 19; 21 are released, i.e. at that point in time are not used for proof-pulling.

In an advantageous arrangement, cylinders 16; 17 of the offset tower 02 can be driven so that the printing machine 13 of the offset tower 02 are each rotationally driven by at least one drive motor that is mechanically independent of the other printing machines 13. The drive motors 61 are preferably electric motors 61 controlled by their angular position, e.g. asynchronous motors, synchronous motors or direct current motors. In an advantageous further development there is at least one gearbox 62 between the drive motor 61 and the cylinder 16; 17; 18 or cylinder pair 16; 17; 18, 18 being driven, in particular a reduction gearbox 62 (such as for example spur and pinion gearbox, ancillary gearbox and / or planetary gearbox). The use of individual drives contributes to high flexibility and to avoidance of vibration in the mechanical drive systems, thus to high quality in the product. In the following figures 8 thro 10 only the components on the right hand side are identified with their reference numbers, since the left hand side is simply a mirror image of the right hand side. Alternative configurations are indicated for each of the upper and lower printing machines and for the inking and dampening systems 14; 20, which are interchangeable with each other.

In fig. 8 all nine cylinders 16; 17; 18 are each driven by their own drive motor 61, which each drives the cylinder 16; 17; 18 through a gearbox 62. The ink train 14 shown above is fitted with two friction rollers 63 as well as with other rollers that are not shown. The friction rollers are driven by their own common drive motor 64. The two friction rollers 63 can be moved and driven in an axial sense by means of a drive train (not shown). The ink train 14 shown below has only a single friction roller 63. The upper dampening system 20 is fitted with two friction rollers 66 as well as with other rollers that are not shown. The friction rollers are driven by their own common drive motor 67. The two friction rollers 66 can be moved and driven in an axial sense by means of a drive train (not shown). The lower dampening system 20 has only a single friction roller 66. In a variant, which is indicated in the upper printing machine by dotted lines, the ink train and / or dampening system 14; 20 is not driven by its own drive motor 64; 67, but takes a rotary drive from the rollers 16; 17; 18, in particular from form cylinder 16 by means of a mechanical coupling, using e.g. gears and / or belts.

In contrast to fig. 8 both the cylinders 16; 17 of each printing machine 13 in the arrangement shown in fig. 9 are driven by a common drive motor 61 on the transfer cylinder 17. The drive can be arranged axially, e.g. using a gearbox 62, or can be via a pinion gear driving a drive gear on the transfer cylinder 17. The drive gear on the transfer cylinder 17 can then drive a further drive gear on the form cylinder 16. The drive linkage 68 (as shown as a dotted line) can take the form of gearing or a belt drive, and in a further development is encapsulated. The arrangement used for the drive of the ink train and any necessary dampening system

14; 20, whether using their own drive motors 64; 67 or derived from a cylinder 16; 17; 18 should always be as shown in figure 8.

In contrast to fig. 9 both the cylinders 16; 17 of each printing machines 13 in the arrangement shown in fig. 10 are driven by one common drive motor 61, which however drives the form cylinder 16. Once again the drive can be arranged axially, e.g. using a gearbox 62, or can be via a pinion gear driving a drive gear on the form cylinder 16. The drive gear on the form cylinder 16 can then drive a further drive gear on the transfer cylinder 17. The drive linkage 68 can be arranged as shown in fig. 9. The arrangement used for the drive of the ink train and any necessary dampening system 14; 20, whether using their own drive motors 64; 67 or derived from a cylinder 16; 17; 18 should once again always be as shown in figure 8.

In contrast to the arrangement indicated in figs. 8 and 9 by the dotted line showing the ink train and / or dampening system 14; 20 without their own rotary drives, it is however in a further development advantageous to drive the ink train and / or dampening system 14; 20 from the transfer cylinder 17. This allows a definite instantaneous flow rate to be achieved and avoids any irregularities arising from change of flank from one gear tooth to the next. An arrangement of this type of drive train is shown schematically in fig. 11.

Through a pinion gear, drive motor 61 drives a drive gear 72 that is rotationally stiffly connected to form cylinder 16, which in turn drives a drive gear 73 that is rotationally stiffly connected to transfer cylinder 17. Either the drive gear 73 is a wide type or a second drive gear 74 is attached to the transfer cylinder 17. The wide or additional drive gear 73; 74 drives through a rotary drive gear 77 mounted on a spigot 76 on form cylinder to a drive gear 78 for the ink train and / or dampening system 14; 20. The drive gears 72; 73; 74; 77; 78 are preferably spur gears. For the case that form cylinder 16 for adjusting the axial position by for example ± ΔL, at least the pinion 71 and the drive gears 72 thro 74 should be straight toothed. Between drive motor 61 and the gearbox from pinion 71 and drive gear 72 an additional encapsulated ancillary transmission gearbox 62 can be fitted, indicated here by a dashed line. The drive to form cylinder 16 can also alternatively be axial, by means of spigot 76, which allows an axial movement of the form cylinder 16 using an axial relative movement (not shown) between the form cylinder 16 and the coupling at the output from drive motor 61. The satellite cylinder 18 in this arrangement is also driven by a pinion 71 to an associated drive gear 79, in particular spur gear 79. Each drive train is driven by an independent drive motor 61 in a advantageous arrangement at least for those in smaller units are encapsulated units (shown as a dashed line in fig. 11).

The arrangements described for the offset tower 02 and for the printing machine 13 and their cylinders 16; 17; 18 and their drives allow low-vibration, precision registration printing of a

high quality with a low technical requirements and in a small space coupled with achievement of product excellence.

After web 03 has been printed with for instance six pages width, this runs over guide elements and / or draw rollers that need not be described in detail, into the area of the superstructure 04 where it is fed for instance through longitudinal slitters 06 (fig. 12). These have for instance a roller 81, with for instance a draw roller driven by its own drive motor 81, which functions together with the proof-pulling rollers in order to avoid slippage. Longitudinal slitters 06 and draw rollers 81can also be implemented separately from each other, in which case preferably the longitudinal slitters 06 operate in conjunction with another roller. In this arrangement of longitudinal slitters 06 the web 03 is divided into multiple, for example three, partial web-width webs 03a; 03b; 03c, referred to for briefness as partial webs 03a; 03b; 03c (symbolically indicated by their centre lines, lines 03a, 03b only indicatively), longitudinally slit before these partial webs 03a; 03b; 03c following guide elements, e.g. rollers for register controls 08, turn rods for turn units 07, run-on rollers for intake to former folders or draw rollers. So as to achieve a relatively vibration-free web transport relative to the web tension, all guide elements be they individual, multiple, undriven or simply driven by friction with webs 03a; 03b; 03c, which are provided for guidance of the partial webs 03a; 03b; 03c, shall be of a reduced length. Compared to the requirements for a web width of six printed pages, this allows a substantial reduction in length and strength, because the load-bearing capacity is much less. The risk of vibrations, in particular in the event of changes of speed, which

would arise otherwise is effectively reduced, which in turn avoids the negative consequences for registration precision and print quality that would otherwise occur. The following arrangements for guidance elements of reduced length, for lateral position change capability and for arranging a register roller with another guide element can be used on a very wide variety of printing machines, but above all with particular advantage on machines that are six plates wide.

Fig. 12 shows an isometric view of a first arrangement example for at least a part of the superstructure 04. The example in fig. 12 shows the partial web 03b turning outwards from the centre. A second one of the partial webs 03a; 03c; could for instance by means of a second turn unit 07 of this type be directed into another direction. A second turn unit can for example be placed above or below the first turn unit 07.

The turn unit 07 has as the guide element 82 the usual two parallel or crossed turn bars 82, which form an angle of approx. 45° or 135° to the incoming partial web 03a; 03b; 03c, and by means of which an incoming web 03a; 03b; 03c can be laterally displaced and/ or inverted. The turn bars 82 exhibit advantageously a length L82, the projection of which on to the crosswise dimension of the incoming partial web 03a; 03b; 03c is very slightly greater, for instance between 0 % and 20% greater, than the width of the incoming partial web 03a; 03b; 03c, that is, the length L82 is approx. 1.4 to 1.7 times that of the partial web. At least the length L 82 is chosen to be such that its projection is less than or equal to twice the width of

one of the two page partial web 03a; 03b; 03c, i.e. the length L82 is at most 2.8 times the partial web. In an advantageous further development the turn bars 82 are each mounted on carriers 83, which are crosswise to the incoming partial web 03a; 03b; 03c and whose location can at least be moved by means of a guide 84. The now "short" turn bars 82 can now be brought into the necessary position according to the requirements of the desired web. In some circumstances both turn bars 82 can be mounted on this type of carrier 83.

Displaced, turned, overlaid and / or inverted partial webs 03a; 03b; 03c experience in comparison to other partial webs 03a; 03c as a rule a displacement of their direction of travel and therefore must be corrected in the longitudinal register by means of a register control 08. The register control 08 has a guide element 86 with at least one moveable roller parallel to the direction of travel. The roller 86 or several roller 86 of the register control 08 advantageously have a length L86 which is very slightly greater, for instance between 0 % and 20% greater, than the width of the incoming partial web 03a; 03b; 03c. At least the length L 82 is less than or equal to twice the width of one of the two page partial web 03a; 03b; 03c. In an advantageous further development the register control 08 is mounted crosswise to the incoming partial web 03a; 03b; 03c on at least one guide 87 whose location can be moved. The register control 08 is now narrow and together with its short roller 86 can now be brought into the necessary position according to the requirements of th desired web routing.

As well as the slitters and any necessary turning devices / registration devices, the partial webs 03a; 03b; 03c are fed over other undriven guide elements, such as guide rollers which are not shown, before finally they are fed into the run-in rollers or harp rollers 89 of what is called the harp 09 (fig. 1) situated in front of the former folder 11. For the webs 03 that run straight through and for partial webs 03a; 03b; 03c there is in the superstructure 04 upstream from the harp roller 89 for instance a register roller 91 and a diverter roller 92 arranged across the full web width b03, whose position can be varied along the transport direction.

In an advantageous arrangement the length of a guide roller and / or harp roller 88 is L88; 93 is very slightly greater, for instance between 0 % and 20% greater, than the width of the incoming partial web 03a; 03b; 03c. At least the lengths L 88; L93 (fig. 13) are less than or equal to twice the width of one of the two page partial web 03a; 03b; 03c. In the example shown in fig. 12 the "short" harp roller 88 is split into sections 88, however in total it constitutes harp roller 89 whose total width is sufficient for a web 03 whose width is six printed pages. The sections 88 are each free here to rotate independently.

The "short" harp roller 88; 93 as guide element can however be fitted instead of or in addition to a section 88, even, as shown in fig. 13, implemented as an individually mounted harp roller 93 in its own frame. This can either be fixed in the frame or also on a carrier 94

or a guide 96 crosswise to the direction of travel of the incoming partial web 03a; 03b; 03c with scope for local adjustment.

Since the displacement on turning displacement, inversion etc, applies only to these partial webs 03a; 03b; 03c and is connected with their special routing, in an advantageous arrangement the necessary register control 08 can be arranged in combination with one or more of the guide elements for the routing of the partial web 03a; 03b; 03c, such as the turn unit 07 or one of the turn rods 82 or the harp 09 or a “short” harp roller 93.

In fig. 13 for instance the “short” register control 08 is arranged in combination with the “short” harp roller 93 and then can be adjusted together with this for position using the guide 96 arranged crosswise to the incoming partial web 03b; 03c.

In fig. 14 for instance the “short” register control 08 is arranged in combination with one of the “short” turn bars 82 and then can be adjusted together with this for position using the guide 84 arranged crosswise to the incoming partial web 03b. This arrangement is here shown for crossed turn bars 82, but it could equally well be used for parallel turn bars 82 as shown in fig. 11. For the case that turn bars 82 which are crossed or orthogonal to each other are used, at least one (here two) diverter rollers 97 are used with axis of rotation perpendicular to that of roller 81 axis of rotation.

In an advantageous further development one of the 3-page width printing machines in the superstructure is assigned to the entire web 03 two of this sort, with register control and turn units 08; 07 or with register control and harp roller 93 joint positional adjustment "short" device one above the other.

The guides 84; 96 (figs. 13 and 14) for the arrangement examples described above can be implemented in a wide variety of different ways. For instance the guides 84; 96 can be arranged as spindles with at least sectioned threads, which are mounted on both sides and can be turned, and can be driven with a rotary drive (not shown). The carriers 83; 94 can be arranged as sort of sliding chocks also in a rigid guide 84; 96 for instance as profiles. In this way a drive for the carrier 83; 94 can also be provided using a driven spindle or otherwise.

In the centre of the adjustable position turn bar 82 there can be variable overlaps and displacements of partial webs 03a; 03b; 03c over one or two partial web widths (or also multiples of half a partial web width). In such cases the printed partial webs 03a; 03b; 03c are each aligned with one of several, here three, former folders 101; 102; 103 (fig. 15) of the folder structure, arranged alongside one another crosswise to the direction of travel. The transfer must permit for instance the requirements of different thicknesses in the individual ribbons and correspond to semi-finished and finished end products, whilst at the same time permitting effective printing of the fullest possible web width.

For n webs 03; 03 to be printed (e.g. n print towers 01) each of a maximum width b03 of m printed pages, the superstructure 04 has in an advantageous arrangement at least (n * (m/2 – 1) turn units 07. In the case of a six page width printing machine with for instance three webs 03; 03 (and three print towers 01) per section there are advantageously six turn units 07 per section.

In an arrangement of the a printing machine with for instance two sections each of three print towers 01 and in total six webs 03; 03 ; 03″ each four printed pages wide for four-colour printing on both sides, there are at least three turn units 07 provided per section.

In an advantageous arrangement of a printing machine with for instance two sections each of two print towers 01 and in total four webs 03; 03 ; 03″ each four printed pages wide for four-colour printing on both sides, there are four turn units 07 provided per section. In the printing machine with two sections i.e. a total of four print towers 01 (four webs 03; 03) the combined operation can yield a product with a total thickness of for instance 96 pages. As well as the displacement of a partial web 03a; 03b; 03c by a whole number multiple of its partial web width b03a, an advantageous operating mode is possible whereby a partial web 03a; 03b; 03c is displaced by an odd number multiple of a half partial web width b03a and / or former folder width (i.e. by a factor 0.5; 1.5; 2.5) (fig. 15). This can be done by means of long turn bars (not shown) which extend over the entire width of the printing machine or the width b03 of the entire web 03, but also advantageously by means of the locally adjustable

"short" turn bars 82 described above. The turn bars 82 are then for example arranged as shown in fig. 15, so that the first turn bars 82 enclosed by the partial web 03a; 03b; 03c are aligned at least with the entire width of the following former folder 101; 102; 103, whilst the second turn bar 82 is at least aligned with the neighbouring halves of the two following former folders 101; 102; 103 which lie alongside each other.

The partial web 03a; 03b; 03c displaced by an odd number multiple of a half former folder width b101 or partial web width b03a thus runs "between" the former folders 101; 102; 103. This is shown in figs. 15 and 16 in the example of a folder structure with a width of six printed pages on a partial web 03a; 03b; 03c with a width of two pages, however this can also be applied to machines of other widths. Therefore no partial webs 03a; 03b; 03c with width of a single sheet or partial webs 03a; 03b; 03c with width of half a former folder can be printed and fed through the machine. A higher multiple of the product is however possible.

The partial web 03a; 03b; 03c displaced by an odd number multiple of a partial web width b03a or partial web width b03a will be longitudinally slit before it reaches the former folders 101; 102; 103 by slitters aligned between the two matching former folders 101; 102; 103, following which it runs on to the folder structure 11 or the harp 09, i.e. split or not split harp roller 89 and / or "short" harp roller 93 (fig. 16).

In fig. 16 a schematic section of fig. 15 is shown with examples of different harp rollers 89; 93, whereby for example the partial webs 03c is displaced from its original position (shown incomplete) by one-and-a-half partial web widths b03a. It can, for example if the product is cut with a further longitudinal slitter 104 ahead of the former folders 101; 102; 103 (which must always be a printed page or a newspaper page width wide), in each case split into two halves creating the partial webs 03a and 03b which each are fed to a former folder 101; 102. Both the (semi-finished) products then each have for instance a partial web width 03c1; 03c2 of at least a printed page in width from what previously was a partial web 03a; 03b; 03c of two printed pages width. In addition partial webs 03a ; 03b ; 03c can be brought in, for instance printed webs 03 from another print unit 02 or another print tower 01 to run on to one or more of the harp rollers 89; 93. The partial webs 03a, 03a , 03c1; 03b, 03b , 03c2 can now each for instance be collated into a ribbon 109; 111; 112 on the same alignment and fed to a former folder 101; 102; 103. In the example shown thus from two printed webs, each double sided printed in double size and triple width print units (e.g. four-colour) 03; 03 products or semi-finished products (also called volumes or books) with the following, in accordance with the mounting of form cylinder 16 and the corresponding mode of operation of folder structure 12 a different number of pages can be produced. In simple production, i.e. the form cylinder 16 is mounted in the circumferential direction with two print forms 19 of different printed pages A1, A2 thro F1, F2 (or A1 , A2 thro F1 , F2 for the second web 03) and in the folder structure 12 they are transversely folded and collated so that the ribbons 109 and 111 can each produce two different volumes each of 10 printed pages, and the

ribbon 112 can produce two different volumes each of four printed pages. A total product has then 48 pages. If this printing machine is used in double production, i.e. the form cylinder 16 is mounted with two print forms 19 of the same printed pages A1, A1; thro F1 (or A1 , A1 thro F1 , F1) and in the folder structure 12 they are not collated, then the ribbons 109, 111 and 112 each produce two identical volumes each of the above numbers of pages. A total product has then only 24 pages, but is produced at twice the rate of output.

The harp rollers 89; 93, in particular if they are not split over the whole length, can in a further development be driven separately by their own drive motors (not shown). These can then be adjustable for instance in relation to their speed of rotation and also in their position and can thus be specified in the machine controls or using by electronic control in relation to a master reference axle.

A shown in fig. 17, the folder structure 11 exhibits at least two former folders 101; 106; 102; 107; 103; 108 one above the other, whose plane of symmetry S is aligned with the partial web 03a; 03b; 03c that runs in a straight line from one of the printing machines. In particular the planes of symmetry S of both the former folders 101; 106; 102; 107; 103; 108 that lie one above the other largely coincide with a centre line plane M of a partial web 3a; 3b; 3c (3a ; 3b ;3c or 3a″; 3b″; 3c″ or 3a ″; 3b ″; 3c ″ etc.) which is two page widths wide and is diverted only in the vertical sense. In fig. 18 some of the partial webs 3a; 3b; 3c etc. are

drawn in solid lines and some are shown with a dashed line to another part, for reasons explained below.

For printing machines that are six printed pages wide there are arranged two vertically offset groups each of three former folders 101; 102; 103 or 106; 107; 108 as shown in fig. 17. For four printed page widths there can be two former folders alongside each other, and for eight printed page widths there can be four former folders alongside each other. Each pair of an upper and a lower former folder 101; 106; 102; 107; 103; 108 are aligned as a pair in the style and method described above to a centre plane M. The three former folders 101; 102; 103 or 106; 107; 108 or a group are displaced transversely to the direction of travel of the partial webs 03a; 03b; 03c, and in an advantageous arrangement are arranged to be essentially at the same height. They can however if necessary be displaced vertically to each other and / or be at various vertical heights, allowing them partially to overlap each other in the horizontal plane.

Seen in the direction of travel of the webs, before the folder structure 11, at least before one of the groups of former folders 101; 102; 103 or 106; 107; 108 one above the other which lead in to the former folder for the webs 03; 03 ; or partial webs 03a; 03b; 03c. with the fixed harp 09, there is a group of several parallel run-in or harp rollers 89;93 displaced in a radial sense to each other, over which the different webs 03; 03 ; or partial webs 03a; 03b; 03c or 03a ; 03b ; 03c etc. from the superstructure 04 are fed before reaching the folder structure

11. For the harp rollers 89; 93 the webs are collated into a ribbon 109; 111; 112 or into several ribbons 109; 111; 112. The subsequent position of partial webs 03a; 03b; 03c or 03a ; 03b ; 03c within ribbon 109; 111; 112 and the printed pages in the semi-finished or finished end product can be changed by the relative positions of the partial webs 03a; 03b; 03c or 03a ; 03b ; 03c within the harp 09. The harp rollers 89; 93 of a harp 09 are displaced from each other vertically and / or horizontally and preferably constructed as an assembled module mounted in a common frame. In principle, a harp of this type is provided for each of the vertically displaced groups of former folders 101; 102; 103 or 106; 107; 108.

A saving can be made in the height required by an advantageous arrangement as shown in figs. 1 and 19, where both the two former folders 101; 106; 102; 107; 103; 108 that are mounted above one another and in the same plane of symmetry have a common harp 09.

For n full webs 03; 03 to be printed (e.g. n print towers 01 of a section) of a maximum width b03 of m printed pages, the harp in an advantageous arrangement has at least (n * m/2) harp rollers 88; 89; 93, whose axis of rotation for instance largely lie in a common plane, and which preferably are mounted in a common frame. In the case here of a printing machine six page widths wide and for instance two webs 03; 03 (and two print towers 01) there are advantageously at least six harp rollers 88; 89; 93 for each harp.

In an arrangement of one section of the printing machine with three print towers 01 and three partial webs 03; 03 ; 03″ for four-colour printing on both sides there are at least nine

harp rollers 88; 89; 93 provided per harp 09. In this section then in collation operation a product with a total thickness of for instance 72 pages can be produced.

In an advantageous arrangement of a printing machine with for instance two sections, each of two print towers 01 and a total of four partial webs 03; 03 ; 03″ each six page widths wide for four-colour printing on both sides there are at least six harp rollers 88; 89; 93 provided per harp 09 in each section. These six harp rollers 88; 89; 93 per section, i.e. a total here of twelve, can be arranged to run through two separately mounted harps 09. e.g. over a common folder structure 11 or two folder structures 11, but also in two alignments through a harp 09 within a single frame. In this printing machine with two sections, i.e. a total of four print towers 01 (four webs 03; 03) then in collating operation a product with a total thickness of for instance 96 pages can be produced.

In an arrangement of a printing machine with for instance two sections each of two print towers 01 and a total of four partial webs 03; 03 ; 03″ each six pages widths wide for four-colour printing on both sides there are at least six harp rollers 88; 89; 93 provided per harp 09 in each section. These six harp rollers 88; 89; 93 per section, i.e. a total here of twelve, can be arranged in two separately mounted harps 09. e.g. over a common folder structure 11 or two folder structures 11, but also in a common frame harp 09 e.g. in two alignments. In this printing machine with two sections, i.e. a total of four print towers 01 (four webs 03; 03

) then in collating operation a product with a total thickness of for instance 96 pages can be produced.

If only one folder structure 11 is provided for two sections, then the number of harp rollers 89; 93 required is determined for the configuration of the sections. If the folder structure 11 is positioned between the two sections, then either all the harp rollers 89; 93 should be arranged in the same alignment, or however to save installation height the harp rollers 89; 93 for each section can be each placed in their own alignment and the two alignments displaced horizontally in a radial sense relative to each other. The harp rollers 89; 93 of the two alignments should in this case both be arranged within a common frame.

If, as shown in fig. 1, there are in fact two folder structures 11 provided for the two sections, it can nevertheless be advantageous for at least one of the two harps 09 to be provided with a number of harp rollers 89; 93 in both the above-mentioned alignments, which are necessary for the two sections. This allows a great degree of flexibility in production thicknesses and compilations. The webs 03; 03 printed in one section can now if needed be routed for further processing through the harp 09 of the other section, and vice versa.

According to fig. 18 at least one of the partial webs 03a; 03b; 03c which run through the common harp 09 ahead of the upper former folders 101; 102; 103 can be directed to run through the lower former folders 106; 107; 108. According to the thickness desired for the

individual semi-finished product (volumes, books) a greater or lesser number of the partial webs 03a; 03b; 03c can be changed over from the upper former folders 101; 102; 103 to the lower former folders 106; 107; 108. According to production requirements this allows different thicknesses of ribbons 109; 111; 112; 113; 114; 116 to be run to either the upper former folders 101; 102; 103 or to the lower former folders 106; 107; 108. For instance the partial webs shown as dashed lines in fig. 17 as ribbons 113; 114; 116 are arranged to run through the lower former folders 106; 107; 108, and those shown as solid lines arranged to run through the upper former folders 101; 102; 103. Here also the "dividing line" between the partial webs 03a; 03b; 03c which lie above one another from the common harp is flexible, so that thicker semi-finished products (volumes, books) or finished products require reduced effort to set up. In fig. 16 a second alignment of harp rollers 89; 93 is shown as a dashed line, be means of which the partial webs 03a; 03b; 03c described above can for instance be taken from a different section.

In the case of multi-colour production it is advantageous from the point of view of flexibility when using the folder structure 11 with common harp described above that all print units 02 or pint towers 01 and the webs 03; 03 have the same colour capability as each other. So for instance the web 03; 03 and the partial webs 03a; 03b; 03c etc. and also the printing machine 13 can be selected flexibly for a coloured cover sheet and the thickness of the semi-finished product can be variable.

The above mentioned folder structure 11 with only a single harp 09 for two former folders 101; 106; 102; 107; 103; 108 is also suitable for other printing machines with other cylinder widths and cylinder circumferences. A folder structure of this type, comprising two former folders 101; 106; 102; 107; 103; 108 arranged one above the other and having a common harp 09 can also be combined with a third former folder with its own harp 09. The folder structure 11 described with multiple vertically displaced former folders 101; 106; 102; 107; 103; 108 and associated harp 09 can also be used to good effect on three former folders 101; 106; 102; 107; 103; 108 arranged one above the other.

External cover pages of for example an outer book can thus be routed via a particular web and / or a particular pint tower / print unit.

The harp that is associated with multiple former folders 101; 106; 102; 107; 103; 108 allows the partial webs 03a; 03b; 03c that are arranged one above the other to be processed flexibly according to the needs of the product into different thicknesses of books, without requiring a major effort to arrange additional superfluous displacements of partial webs 03a; 03b; 03c. So for instance from four partial webs 03a; 03b; 03c lying one above the other in one case three webs can feed into one former folder 101; 106; 102; 107; 103; 108 and the other one web can feed in the other former folders 101; 106; 102; 107; 103; 108, whilst on another occasion two of the four partial webs 03a; 03b; 03c can be combined and fed into two of the former folders 101; 106; 102; 107; 103; 108. It is particularly advantageous that

adjacent ribbons 109; 111; 112; 113; 114; 116 of different thicknesses can be combined as shown in fig. 17.

The draw roller 117 and former folder feed-in roller 118 for the former folders 101; 106; 102; 107; 103; 108 have in an advantageous arrangement each their own drive motors 119, just as has the draw roller 121 for the folder structure 11 (fig. 19). In fig. 19 the draw roller 117 for the lower group of former folders 106; 107; 108 is not visible. The respective drive motor 119 for the draw roller 121 is shown in fig. 19 merely by an infilled area alongside the respective draw roller 121. Each of the former folders 101; 106; 102; 107; 103; 108 has in an advantageous arrangement at least one of these draw rollers 121 associated with it, which works in combination with the proof-pulling rollers or a single proof-pulling roller via ribbons 109; 111; 112; 113; 114; 116. In addition to this the folder structure 11 has advantageously undriven guide rollers 122, over which the ribbons 109; 111; 112; 113; 114; 116 which are one printed page in width can be fed.

Particularly advantageous, e.g. in view of the need set up / maintain longitudinal registration, is that the folder structure 12 has at least one drive motor 120 of its own, mechanically independent of the print units 02. Whilst the drive motors 119 of the draw roller 117 and former folder feed-in roller 117; 118; 121 of the folder structure 11 and / or the driven draw rollers 81 of the superstructure 04 must merely arranged to be controllable in respect of rotational speed (and can be arranged to maintain a set angular relationship), the drive

motor 120 in an advantageous arrangement can be controlled and regulated in respect of its angular position.

This arrangement permits the print units 02 and folder structure 12 (and their drive motors 61; 120), whose drives are mechanically independent of each other to be linked regarding their angular position by a virtual electronic reference axis. In another arrangement for instance the angular position of the folder structure 12 (and its drive motor 120) are determined and based on this the angular position relative to the print units 02 and printing machine 13 to this is determined. The drive motors 80; 118 for the driven rollers 81; 117; 118 that are controlled merely by their angular speed received their speed settings for instance from the machine controls.

By equipping the rotating roller printing machine with three times width and double size transfer and for cylinders and the corresponding arrangement of the folder structure, with a single web for instance in double production

- a book of twelve pages
- a book of four pages and a book with eight pages
- two books with six pages
- three books with four pages

can all be produced, together with further variations.

In collation mode production the numbers of pages can be doubled with semi-finished products in each case of two longitudinally folded sections.

For printing in tabloid format with respective numbers of pages can in each case be doubled. The dimensioning of the cylinders 16; 17; 18 and the groups of former folders 101; 106; 102; 107; 103; 108 should be used for the respective "landscape" printed pages. So that in the circumferential direction, in the direction of running of the web 03a; 03 ; 03a; 03b; 03c of a section A; B; C two flat from pages are shown, the form cylinder 16 can then therefore for instance in one circumference exhibits the equivalent of four landscape pages in tabloid format. The number of printed pages in the longitudinal direction remains on the web 03a; 03 ; 03a; 03b; 03c, and cylinder 16; 17; 18 and the former folder width are maintained.

In a particularly advantageous arrangement of the three times width printing machine the folder structure 12 is provided with a transport cylinder 123, for instance a collation and / or flap fold cylinder, which has scope for accepting more than five section lengths arranged in succession around the circumferential direction, and for a corresponding number of retainers 129.

Amongst other possibilities, three ribbons 109; 111; 112; 113; 114; 116 from three adjacent former folders 101; 106; 102; 107; 103; 108 can be fed simultaneously into the folder

structure 12. However up to six ribbons 109; 111; 112; 113; 114; 116 can be fed from different former folder groups, which then can be further processed into a product.

The transport cylinder 123 is provided with a large circumference, as described above, so as to permit correspondingly large movements for the actuation processes (cutting, holding, folding) which promote reliable operation at high production speeds. The larger radius of curvature has the further benefit of reducing the markedly oblique cut edge imparted to the product, in particular for thick materials.

Fig 20 shows a schematic side elevation of the folder 12. The folder 12 has at least one intake, in this case two intakes, for one or several ribbons 109; 111; 112; 113; 114; 116.

Ribbons 109; 111; 112; 113; 114; 116 run though a pair of draw rollers 124 which regulate the tension. They then impinge on the transport cylinder 123 at the height of a cutting slot 126 between the transport cylinder 123 on the one side and a cutter cylinder 127 on the other side. Instead of two intakes and two cutter slots 126 there can also be provided one, or three, or more. In an advantageous extension at least one pressure roller 140 is provided as a backing pad in the area of the perforation pin penetration (where a perforation fold machine is included), i.e. at the position of the pin penetration of the ribbon bundle immediately prior to the cutter slot 126. This has for instance circumferential grooves,

spaced corresponding to the location of the pins in the axial direction, into which the perforation pins can emerge after penetrating the ribbon bundle / the ribbon.

The ribbon 109; 111; 112; 113; 114; 116 / ribbon bundle is cut in the cutter slot 126 between the cutter cylinder and transport cylinder 127; 123 by at least one cutter knife 128 on the cutter cylinder 127, which for instance operates in conjunction with a corresponding cutter bar (not shown) on the transport cylinder 123 as a backing pad.

The cutter cylinder 127 has a circumference corresponding at least to one, but preferably two or more lengths of the signatures to be created out of the webs 03; 04, and carries two cutter knives 128.

The folder structure 12 exhibits cutter cylinders 127 of this type, arranged around the periphery of the transport cylinder 123, each of which carries two cutter knives. As shown two ribbons 109; 111; 112; 113; 114; 116 or a bundle of ribbons 135 (e.g. coming from different former folders 101; 106; 102; 107; 103; 108) can be brought together in the folder structure 12 and fed into the two cutter slots to be cut separately before collation into a product. The cutter knives 128 in an advantageous arrangement are slightly displaced from 180° to each other around the circumference, so that when operating in collation mode the second cut avoids the cutting the first signature a second time. Thus the signature is cut

shorter and the follow-through is left longer than half the circumference of the cutter cylinder 127. In this case the length of the signature is considered to be the average of these lengths.

The folder machine 12 can in an advantageous version be fitted with a device (not shown) for shortening the effective circumference-related section length. In a first variant of this the transport cylinder 123 has a displacement bar (not shown) in the area of its circumference between each of two transport grippers 129. This can be actuated to extend and retract radially from the face of the circumference, thereby having the effect of shortening the signature in relation to the circumference, or of lengthening the distance between the two grippers. In an alternative version for instance the transport cylinder 123 has an area on its circumference, through which product sections that are picked up can be covered, a recess or hollow (e.g. a groove or a channel), into which a product section that has been picked up can be pressed by a corresponding projection (e.g. a bar or nose) on the circumference of the cutter cylinder 127. This device is associated preferably with the second, i.e. in Fig. 20 the lower of the two cutter cylinders 127. Thus the cut signature on the second (lower) cutter cylinder 127 can also be cut, without a signature already lying on the transport cylinder 123 – this signature being effectively shortened due to the displacement bar effectively shortened – can be cut once again, in particular at its trailing end. The activated, i.e. effectively positioned device for shortening (operating in conjunction between the roller and the bar or raising a displacement bar on the transport cylinder 123) is placed

advantageously within a section length in connection with cutter slot 126 (viewed in the direction of rotation).

The circumference of the transport cylinder 123 is equivalent to more than five, in particular seven section lengths / seven lengths of the signature ("seven field transport cylinder 123").

On the transport cylinder 11 in the circumferential direction there are seven recessed retainers 129 equally spaced one behind another, e.g. perforation bars 129 with extendable perforation pins (perforation folding device). The retainer bars 129 can also be arranged as grippers 129 (gripper folding device). Seven cutter bars are also arranged, which advantageously are each on the spaced slightly in direction of rotation (e.g. 0.3 to 3 cm) away from the position of the clamping point (gripper folding device) / perforation pins (perforation folding device) on the outer circumference of the transport cylinder 123. Also the circumference of the flap fold cylinder 132 corresponds to preferably more than five, in particular seven section lengths / seven lengths of the signature.

The signature cut off from ribbons 109; 111; 112; 113; 114; 116 (cutter length, e.g. length of a portrait printed page, in particular a newspaper page) are forwarded by the retainer 129 on to the transport cylinder 123.

There are furthermore there are seven fold knives 130 fitted on the transport cylinder 123, which are each moved outwards on reaching the gaps 131 (once or several times,

depending on whether in collating mode or normal mode) between the transport cylinder 123 and a flap fold cylinder 132, so that the signatures transported on the transport cylinder 123 are passed on to the flap fold cylinder 132 in a particular way and are folded. For this purpose the flap fold cylinder 132 has as many fold flaps (not shown) spaced equally in succession around the circumference as the number the fold knives 130 and/or grippers 129 on the transport cylinder 127, here in particular seven. The folded products are passed from the flap fold cylinder 132 to a creel 133 and from this to a discharge device 134, e.g. conveyor belt 134.

Advantageously the folder structure 12 can be operated, by means of its transport cylinder 123, optionally in normal mode and in collating mode of operation. In collating mode the transport cylinder 123 does not pass the signature (product cut-off) on to the next cylinder 132 on the first run through of the gap 131, instead it performs a further revolution with the same piece when the retainers 129 hold at least one further signature for passing on to e.g. the flap fold cylinder 132, before passing the signatures thus collated together through the gap 131 to the flap fold cylinder 132. In normal operation mode the transport cylinder 123 always passes the signature on to the next cylinder 132 on the first run through the gap 131. The transport cylinder 123 is a convertible arrangement which advantageously can be in the form of a perforation cylinder 123, in particular with seven perforation bars 129 around the circumference.

Cutter cylinder 127, transport cylinder 123 and flap fold cylinder 132 together with creel 133 as required are preferably driven by a single drive motor 136 (shown schematically in fig. 19 as drive motor 120), mechanically independent of the drives of the print units 03, superstructure 04 and folder structure 11. The drive is arranged advantageously through a gearbox, in particular a reduction gearbox, from drive motor 136 driving one or more of the cylinders 123; 127; 132 of the folder machine 12.

The arrangement shown in fig. 20 shows the drive motor 136 but not the gearbox (e.g. not the pinion or the gear wheel) driving the cutter cylinder 127 (gear wheels driving multiple cutter cylinders 127). From the latter the transport cylinder 123 is driven, and from this the flap fold cylinder 132 and if necessary the further cutter cylinders 127 gearboxes are driven. A belt drive 137 is taken from the flap fold cylinder 132 to power the creel 133.

In another variant shown in fig. 20 only as dashed lines the transport cylinder 123 is driven by a drive motor 136 not shown in this case, through a pinion 138 and drive gear 138 (shown in dashed lines). The cutter cylinder 127 and flap fold cylinder 132 are driven by the transport cylinder 123. A belt drive 137 is taken for instance from the flap fold cylinder 132 to power the creel 133.

In both the cases described it is preferred that the discharge device 134 is driven by its own drive motor, mechanically independent of the drives of the cylinders 123; 127; 132 and the creel 133.

Cutter cylinder 127, transport cylinder 123 and flap fold cylinder 132 can also each be driven by their own drive motors, mechanically independent of the drives of the printing machines.

In another advantageous arrangement of the drives, the cutter cylinder 127, transport cylinder 123 and flap fold cylinder 132 are driven by at least a common drive motor 136 or alternatively each by its own drive motor 136, mechanically independent of the drives of the printing machines, whilst in a first variant the creel 133 and discharge device 134 are driven by a common drive motor, mechanically independent of the drives of the cylinders 123; 127; 132 and the drives of the printing machines, and in the second variant each of the creel 133 and discharge device 134 is each rotationally driven by its own drive motor.

Where necessary also a belt system is provided to drive the product sections in the folder machine 12, within which the cylinders 123; 127; 132 can be driven by their own mechanically independent drive motors.

When the circumference of the transport cylinder 123 is equal to seven cutter lengths, it is possible as described above that twelve webs 03 and the corresponding number of partial webs 03a; 03b; 03c etc. (up to seventy-two paper layers) divided into up to six ribbons 109; 111; 112; 113; 114; 116 can be fed into the folder structure. Using a folder structure 12 without collation operation a product with a total of 144 pages, in particular newspaper pages, can be produced. If the folder structure 12 is configured for collation operation, then using the six webs 03 the product can be for instance 14 pages, or if more webs 03 are used then products with even greater numbers of pages can be produced. For the last named product the folder structure 12 can for instance be arranged for cylinder folding, however the retaining devices 129 and the flap folds must be arranged to accommodate this number of layers.

It is advantageous in this respect if the intake area for the pair of draw rollers 124 or multiple pairs of draw rollers 124 are each fitted with at least one drive motor 139 of their own. This allows multiple ribbons 109; 111; 112; 113; 114; 116 to be collated in the intake area of the folder structure 12. In an advantageous further development the folder structure 12, as shown, has two pairs of draw rollers 124 and the cutter cylinders 127 operate n conjunction with the transport cylinder 123. By this means in the intake area two “bundles” can be collated from multiple ribbons 109; 111; 112; 113; 114; 116, and these bundles can be fed one after the other to the transport cylinder 123 and cut separately from each other. These measures also contribute to the product thickness as described above. By this means

bundles of different or identical numbers of ribbons 109; 111; 112; 113; 114; 116 can be fed into the two pairs of draw rollers 124; or simply all, or a certain number, of the total ribbons 109; 111; 112; 113; 114; 116 can be fed to one of the two pairs of draw rollers 124.

In the arrangement shown the folder structure 12 has a further draw group 142 which is driven by a drive motor 141 (or if there are two intakes, two further draw groups 142) ahead of the cutter gap 126. This is particularly advantageous if two cutter cylinders 127 are provided. The draw groups 142 are then spaced out by the same distance from the respective cutter gap 136 along the "bundle web".

An advantageous version variant of a folder machine 12 - in particular, but not exclusively for the folder machine 12 depicted and described above - instead of the cutter cylinder(s) 127 with two cutter knives 128 mounted in succession around the circumference has one cutter cylinder 127' with four cutter knives 128 mounted in succession around the circumference (Fig. 21). The circumference of the cutter cylinders 127' corresponds essentially to four section lengths of the product to be cut. With a single revolution four cuts are performed by the four cutter knives 128 mounted in succession around the circumference. The four knives 128 can in an advantageous version - varying from the equidistant arrangement – be each at a spacing of 90°-δ and 90°+δ to each other, whereby δ represents a small angle (e.g. less than 2°, in particular less than 1°). In particular the longer and shorter sections should vary from the average by approx. 1 to 5, in particular 1.5 to 3.5 mm, i.e. two successive sections

should differ in their length by a total of 3 to 7 mm.

Whilst the cutting force can be increased as necessary, a reduction in the wear of the groove rubber, print bars and/or knives is achieved. By optimisation of the diameter of the cutter cylinder 127' a reduction is achieved in the excavation effect on the groove rubber and the bending stress on the knives 128.

Two or more ribbons or ribbon bundles 135 can for instance be combined prior to entry into the cutter slot 126 through a roller or pair of rollers 125 – either with a motorised drive (as for group 125) or simply undriven (guide rollers). Or simply a ribbon bundle 135 can be fed to the folder machine 12 and into the cutter slot 126. In Fig. 21 for simplicity the detailed depiction of the other conveying systems (drive motor 141, driven draw group 142 etc.) and the drive motors 136 including the draw drive are omitted, but this can advantageously be incorporated in one of the above mentioned variants (but without the upper cutter cylinder 127). The circumference corresponds to four (average) lengths of the signatures to be produced from the webs 03; 04. Again in one version as shown above, the cutter knives 128 are not equidistantly arranged on the circumference of the cutter cylinder 127', but alternate between angular segments somewhat larger than 90° and somewhat smaller than 90° on the circumference.

For fold machine or folder structures 12 for higher numbers of pages and higher speeds, in addition to the centrifugal forces, the power available for perforation punching (puncturing), clamping (gripping) and cutting is also a critical parameter. The cutter cylinder 127 with four-fold cutters is for this reason particularly advantageous because of its capability for cutting ribbons of great product thicknesses. This applies particularly to in the printing machines described above with printing machines 02 that are three page widths wide and / or in conjunction with a seven-field transport cylinder 123. The arrangement with four-fold division of the circumference is however also useful apart from this, it can be used in any roller print machine and / or in conjunction with multiple field (e.g. five or seven field) transport cylinders of other formats, so as to achieve an increase in precision and / or product thickness capability. The cutter cylinder 127 with four-fold cutters leads to a slight tilting of the cutter knife 128 when striking the cutter bar on the transport cylinder and in the grooved rubber provided there, thus requiring reduced cutting power (energy / force) compared to a cutter cylinder 127 with two-fold cutters. The cutter pushes into the grooved rubber and then emerges from it at a significantly less angle of inclination of the cutter knife 128. Both the bending stress and the compression stress of the cutter knife 128 are thereby less in total than for knives on the cutter cylinder 127 with two-fold cutters.

With the arrangement of a four-knife cutter cylinder 127', a second two-knife cutter cylinder 127 on the circumference of the transport cylinders 123 can be omitted, even when handling a thicker product.

Also shown in Fig. 21 is an advantageous version of the folder machine 12 – as extension to a version with a four knife cutter cylinder 127' and/or 7-section transport cylinder 123 or just for its own sake – with a pressure element 143.

The inclusion of a pressure element 143 permits a better and more reliable perforation of the product sections picked up by the transport cylinder 123 (and the retainer 129) by the perforation pins 144. The bending stress on the perforation pins 144 (pins 144 for short) is reduced and/or the risk of bursting and tearing the product section during perforation is reduced. It is possible in principle for the pressure cylinder 143 to be arranged in different ways for this purpose. For instance the outer circumference can exhibit circumferential channels or recesses corresponding to the axial position of the pins 144 in circumferential direction (accepting the pins 144 as they roll round). Also the outer circumference instead of this or in addition to it can be of yielding material – e.g. foam - which yields when penetrated by the pins 144 at the respective point, but which nevertheless supports the ribbon 135 that is being perforated.

In an advantageous version a one or more part cyclically-applied pressure cylinder 143, e.g. with spring mounted pressure elements 146, is provided, to press the ribbon 135 or the ribbon bundle 135 firmly against the transport cylinder 123 (collating cylinder) during the impression and penetration of the pins 144, thus allowing the paper no possibility of bursting

leading to deviation. The pressure cylinder 143 or the pressure elements 146 exhibit in an advantageous version complementary to the model of development of pressure and transport cylinders 143; 123 on opposite sides the extended pins 144 a group recesses 147, in particular holes 147, for taking up the pins 144. In Fig. 22 the operation of pins 144 and holes 147 in conjunction with the pressure elements 146 is shown diagrammatically. Over the length of the pressure cylinder 143 either one pressure element 146 can be arranged in the form of a bar with several holes 147 or several pressure elements 146 can be arranged alongside each other in the axial direction each with one or more holes 147, whereby the group of holes 146 in all cases as shown above are complementary to the arrangement of the pins 144. The pressure cylinder 143 exhibits advantageously a circumference corresponding to an whole number multiple of a section length of the product section. If the circumference corresponds to one section length, then viewed in cross section a group of holes 144 as described above at axial spacings are provided. If the circumference corresponds to two section lengths then two groups of holes 146 are provided, equidistantly spaced in the circumferential direction.

The perforation pins 144 are e.g. fully extended from the transport cylinder 123 prior to impression, so as to avoid any additional acceleration forces affecting the perforation control curve for the movement of the perforation bar 129. The perforation pins 144 can be strengthened in cross section to increase the stability.

Advantageously – as shown in Fig. 21 - the ribbon 135 / the ribbon bundles should run on to the transport cylinder 123 before the start of impression by the pins 144. The pressure element 146 should preferably be applied after the ribbon 135 has run on to the transport cylinder 123, but prior to the start of impression by the pins 144. The impression and penetration by the perforation pins 144 is performed against this pressure element 146.

Preferably the pressure element should be lifted away from the ribbon or the paper ribbons after perforation has been completed. This would be assisted for instance by the sprung bearings of the pressure elements, which face radially outwards.

As indicated above the pressure element in an advantageous version has holes 147 at the place of penetration by the perforation pins 144. These are made e.g. with a diameter slightly larger than the perforation pins 144 themselves. The holes 147 are e.g. designed to taper outwards towards the rear, so as on the one hand to accommodate the respective tipping of the perforation pins 144 as they penetrate and on the other hand to present a narrow hole 147 to the paper at perforation, preventing bursting as the pin breaks through.

In addition, wiper elements can be provided, which wipe the paper when the perforation pins break through. By a change in design these can e.g. form part of the perforation bar 129 or its movement, so that instead of a swinging perforation holder as for wheel folders, perforation pins 144 that move linearly are used. This allows the holes 147 where the pins

144 enter into the body of the cylinder of the pressure cylinder 143 to be kept so small that they can effectively perform a wiping support function.

In principle it is also possible to have a pressure cylinder 143 without its own spring-mounted pressure elements 146. In this case for instance the holes 147 can be placed directly in the outer circumference of the pressure cylinder 143. They can then once again be complementary to the opposite handed positions of the pressure and transport cylinders 143; 123 pattern of the pins 144 after exiting. The pressure cylinder 143 can be totally spring-mounted against the transport cylinder 123, whereby a minimum torque must be catered for due to the existing degree of wrap-around and/or the impulse at penetration of the ribbon 135.

In a variant according to Fig. 23 the pressure cylinder 143 is used in connection with a two-part cutter cylinder 127. In particular this involves two ribbon bundles 135 sequentially following each other on the circumference of the transport cylinder 123. Each of these ribbon bundles 135 is pressed against the transport cylinder 123 by a pressure cylinder 143 in the manner described above. In contrast to Fig. 22 the ribbon bundles 135 here are wrapped around the respective pressure cylinder 143 to only a small extent and do not run on the transport cylinder 123 before touching the latter. If space considerations permit – if necessary using additional guide rollers – it can advantageously be arranged for the ribbon 135 or the ribbon bundle to run on to the transport cylinder 123 again before starting

perforation by the pins 144 and application of the pressure element 146 after the ribbon 135 has run on to the transport cylinder 123, but before that start of penetration by the pins 144.

The arrangement of the folder intake, for versions with one or two cutter cylinders 127; 127', for configuring of the cutter cylinders 127; 127' as two- or four knife, for arrangement of a pressure cylinder 143, for seven-section size of the transport and/or flap fold cylinders 127; 127'; 132, for the drive variants and/or for use of an arrangement for shortening the effective section length in the context of one of the arrangements shown in figures 20 to 24 and in any case in the context of the respective version examples an advantageous versions depicted, is however even without multiple mentions always transferable to the version examples in the remaining figures 20 to 24, insofar as it is sensible and not contradictory.

The measures listed – seven-section transport cylinder 123, four-knife cutter cylinder 127, pressure cylinder 143 - on the folder machine 12 are in each case considered on their individual merits, but also in particular in explicit combination of more or all measures in particular represent advantageous versions of the folder machine 12. This applies generally for different types of printing press, however in particular to a printing press with one or more of the entities described above for printing six newspaper pages alongside each other.

A great advantage can be achieved in a further development described below of arrangements for the printing machine 13, the superstructure 04 mounted on it, the former

folder 11, the folder structure 12 and / or the drive concept, in respect of an arrangement of an additional printing press 152, with one or more additional printing presses 151, in particular three-cylinder printing presses 151, and / or the advantageous routing and or printed products (see Figs. 23 thro 25, whereby functionally identical reference codes are partially entered only in Fig. 23):

The additional printing press 151 or printing machines are advantageously corresponding to the print units 02 as printing press 151 for indirect flat-bed printing, for which a transfer cylinder 17 is located between the printing position and the form cylinder 16.

A print tower T1; T2; T3 is arranged with at least one additional printing press 152 (addition printing press 152) with at least a further printing press 151, i.e. with at least one printing position. In particular however at least two printing positions in one or two additional printing presses 151 are assigned to the print tower T1; T2; T3; these are arranged in a common additional print unit 152 or in separate additional print units 152. These additional printing positions are advantageously positioned above the printing positions of the print tower T1; T2; T3. The print tower T1; T2; T3 has advantageously a total of eight printing positions, by means of which for instance depending on the web routing and expression of the printing presses 02 forming the print tower T1; T2; T3 one or more webs B10; B20; B30; B40 that can be printed on one side or on both sides. The printing presses 02 of the print tower T1;

T2; T3 are arranged vertically above one another and preferably should be implemented as satellite printing presses 02.

At least two satellite printing presses 02 are additionally assigned, depicted as two printing positions e.g. as two three-cylinder printing presses 151, by which means for instance two webs B10; B20; B30; B40 that have been printed one side only in the print tower T1; T2; T3 can be printed single colour on the other side.

The two satellite printing presses 02 are linked to each other and are components of the print tower T1; T2; T3 by means of which either two webs B10; B20; B30; B40 can be printed each multi-colour on one side or a single web B10; B20; B30; B40 can be printed multi-colour on both sides.

The two satellite printing presses 02 are arranged stacked one above the other. They are advantageously both nine-cylinder satellite offset printing presses.

A three-cylinder printing press 151 has a pair of cylinders, i.e. a form cylinder 16 and a transfer cylinder 17 and a counter-pressure cylinder 126 which operates in conjunction with them.

The two three-cylinder printing presses 151 can advantageously (space requirement, units required) be combined as a six-cylinder printing press 152, but can also be implemented as individual units. It is also possible that only a single printing position in the form of for instance a three-cylinder printing press 151 can be provided, mounted above the print tower T1; T2; T3.

It is advantageous that the two three-cylinder printing presses 151 (one six-cylinder printing press 152) are positioned above one of the last printing positions of the associated satellite printing presses 02. The six-cylinder printing press 152 is for instance arranged stacked above the associated print tower T1; T2; T3. It can however – depending on production requirements – be located stacked on another print tower T1; T2; T3, in particular an adjoining one, provided the web run to the print tower T1; T2; T3 is suitable.

The satellite printing presses 02 and the two three-cylinder printing presses 151 are arranged in respect of each other (web routing permitting) so that so that there exist as options a first operating mode where a web can run through both satellite printing presses 02, a second operating mode where it can run through one of the satellite printing presses 02 and through one of the three-cylinder printing presses 151, and a third operating mode where it can run only through both the two three-cylinder printing presses 151.

The satellite printing presses 02 and the two three-cylinder printing presses 151 are also arranged in respect of each other (web routing permitting) so that there exist as options a first operating mode where the first web can run through both satellite printing presses 02 and a second web can run through both the two three-cylinder printing presses 151, and a second operating mode where both webs can each run through one of the satellite printing presses 02 and through one of the three-cylinder printing presses 151.

In this way two webs can be fed through the print tower T1; T2; T3 and the six-cylinder printing press 152, so that after printing each web has been printed multi-colour on one side, and single-colour on the other side.

One of the two webs is in this way fed through the print tower T1; T2; T3 and the other web is fed only through the six-cylinder printing press 152, so that one web has been printed multi-colour on both sides, and the other web has either been printed single-colour on both sides (S-routing) or two-colour on one side (C-routing, not shown).

At least the printing machine has several print towers T1; T2; T3 each with two satellite printing presses 02 and in addition at least one six-cylinder printing press 152.

The printing presses have at least two, in particular at least three print towers T1; T2; T3 adjoining each other in pairs, whereby at least one six-cylinder printing press 152 is stacked

on one of the two, in particular three print towers T1; T2; T3. Advantageously there is no other processing stage positioned between the respective print towers paired to each other in the way described, in particular no folding operation and / or folding machine. It is important in this respect that the further printing press 151 is located above the printing press 13 of the print unit 02. Advantageously it is stacked on one of the print towers T1; T2; T3.

In the example the printing machine has (at least) three print towers T1; T2; T3 adjoining each other in pairs, whereby at least one six-cylinder printing press 152 is stacked on one of the three print towers T1; T2; T3. A common six-cylinder printing press 152 is assigned to the three print towers T1; T2; T3, which advantageously is stacked on the middle of the three print towers T1; T2; T3.

In this way for instance three webs run through at least two of the print towers T1; T2; T3 and the six-cylinder printing press 152, so that after printing two of the webs have been printed multi-colour on one side, and single-colour on the other side, and the third web is printed multi-colour on both sides (Fig. 25, 24; 25).

In an alternative web routing, two of the three webs are fed through at least two of the print towers T1; T2; T3 and a third web is fed only through the six-cylinder printing press 152 in

this way, so that the two webs first mentioned are printed multi-colour on both sides and the third web is printed single-colour on both sides (or two-colour on one side) (Fig. 23, 22).

The printing machine has advantageously the means 153 (diverter roller 153 and / or draw webs not shown) to guide the webs depending on whatever operation mode is chosen for the printing machine in this production mode and in the production modes made possible by the measures described above (Fig. 25 shows merely a possible example). In particular diverter rollers 153 are provided, as shown for example in Fig. 25 for the web B20, which permit routing of a web B10; B20; B30; B40 to the additional printing press 151; when the web had previously been printed in an adjoining satellite printing press 02 rather than in the printing press directly underneath it. Advantageously in the case of two of the webs B10; B20; B30; B40 routed to the printing press 151, these can be previously have been printed in both the satellite printing presses 02 of the same print tower T1; T2; T3 (Fig. 25: left, Fig. 26: centre, Fig. 27: right).

In an advantageous example, four webs can be fed in this way through the three print towers T1; T2; T3 and the six-cylinder printing press 152, so that two of the webs after printing each are printed multi-colour on one side, and single-colour on the other side, and the other two webs are both printed multi-colour on both sides (Fig. 25 to 25). In a different web routing three of the webs are fed through the three print towers T1; T2; T3 and the fourth web is fed only through the six-cylinder printing press 152 in this way, so that the first-named webs are

printed multi-colour on both sides, and the fourth web is printed single-colour on both sides (Fig. 23, 22) or two-colour on one side (not shown). The printing machine has advantageously the means 153 referred to above to guide the webs depending on whatever operation mode is chosen for the printing machine out of the two (or three) operating modes listed above.

In the foregoing, multi-colour is to be understood as four-colour.

In an operating mode for the printing machine the four webs with the three print towers T1; T2; T3 and the six-cylinder printing press 152 are printed in such a way that both the webs printed multi-colour on one side and single-colour on the other side after printing are routed on a path to a former folder structure TR or former folder 11 so that they come to lie between the two webs that have been printed multi-colour on both sides (Fig. 26). The two webs printed multi-colour on one side and single-colour on the other side have in this case been fed through for instance the centre of the three print towers T1; T2; T3 and the six-cylinder printing press 152.

In another operating mode the four webs are printed by the three print towers T1; T2; T3 and the six-cylinder printing press 152 in such as way that the two webs printed multi-colour on one side and single-colour on the other side after printing are routed on a path to a former folder structure TR underneath the two webs that have been printed multi-colour on both

sides (Fig. 25). The two webs printed multi-colour on one side and single-colour on the other side have in this case been fed through for instance the one of the three print towers T1; T2; T3 that is closest to the former folder structure TR, and through the six-cylinder printing press 152.

In another operating mode the four webs are printed by the three print towers T1; T2; T3 and the six-cylinder printing press 152 in such as way that the two webs printed multi-colour on one side and single-colour on the other side after printing are routed on a path to a former folder structure TR above the two webs that have been printed multi-colour on both sides (Fig. 27). The two webs printed multi-colour on one side and single-colour on the other side have in this case been fed through for instance the one of the three print towers T1; T2; T3 that is furthest from the former folder structure TR, and through the six-cylinder printing press 152.

In these cases also the printing machine is advantageously equipped with means 153 to guide the webs depending on whatever operation mode is chosen for the printing machine, of the three last operation modes listed above.

The satellite print unit displays several, in particular four pairs of cylinders each comprising a form cylinder 16 and a transfer cylinder 17, and at least one satellite cylinder 18 operating in conjunction with one of the transfer cylinders. Advantageously all four pairs of cylinders are

each assigned a satellite cylinder 18 operating in conjunction. Another arrangement is to assign two satellite cylinders 18 to the four pairs of cylinders.

In one arrangement the drives for two of the pairs are linked and are driven by a common drive motor 61 that is independent of the drive for the other drive train. For example the satellite cylinder 18 (or one of the two) is driven by a common drive.

It is advantageous however that a single satellite cylinder 18 is driven at least by a drive motor 61 of its own, independent of the drive for the pairs.

If there are two satellite cylinders 18 these should be driven at least by a common drive motor 61 of their own, independent of the common drives for the pairs.

In an advantageous arrangement, the pairs are each driven by at least a drive motor of their own, independent of the drives for the other pairs. In this case each cylinder of the pair can also have its own individual drive motor.

In a less expensive arrangement the two cylinders of each pair are coupled and driven by a common drive motor 61.

In a less expensive arrangement the drive for an ink train 14 is taken from the drive for the respective form cylinder 16. The ink train can however also be driven by a drive of its own, independent of the drive for the form cylinder 16.

The additional printing press 151 exhibits a pair of cylinders, i.e. a form cylinder 16 and transfer cylinder 17, and a press cylinder / counter-pressure cylinder 18 that operates in conjunction with the transfer cylinder 17. The same applies for a second printing press 151 where this is provided. The print unit 02 used for this can be identified by the fact that it is the one for which the implementation example depicts also an indirect flat-bed print process with the corresponding functionality for cylinders 16; 17; 18.

Correspondingly the six-cylinder printing press 152 exhibits two pairs of cylinders each comprising a form cylinder 16 and a transfer cylinder 17, and each pair having a satellite cylinder 18 operating in conjunction.

In the preferred arrangement the pair(s) (of the printing press 151 or of six-cylinder printing press 152) are each provided with a drive motor 61 of their own, independent of the other pairs.

Each cylinder of a pair can be driven by a drive motor of its own. In an advantageous arrangement however the two cylinders of each pair are coupled and are driven by a common drive motor 61, independent of the other cylinder pairs.

In a less expensive arrangement the drive for the ink train 14 is taken from the drive for the respective form cylinder 16. The ink train can however also be driven by a drive of its own, independent of the drive for the form cylinder 16.

In an advantageous arrangement each counter-pressure cylinder is each driven by a drive motor 61 of its own, independent of the drives for the pairs and of the drives of other counter-pressure cylinders. This is advantageous in respect of achieving independent positioning of the two printing presses.

If necessary however the two counter-pressure cylinders can be driven by at least one common drive motor 61, independent of the drive for the pairs.

In the simplest arrangement, the drive for the counter-pressure cylinder can be taken from the drive for the respective pair of cylinders.

In the preferred arrangement, the paired cylinders are driven as a pair by a shared common drive motor 61, and the counter-pressure cylinder is driven individually by a drive motor 61 of its own.

By means of the printing machine a printed product (or web ribbon) can be produced, so that of four webs after printing two adjoining webs routed to a former folder intake can each be printed multi-colour, in particular four-colour, on one side and single-colour on the other side; and the other two webs are printed multi-colour, in particular four-colour, on both sides:

For example a printed product / ribbon of four webs, taken successively from bottom to top, having the following colour formats: bottom web 1 : 4 (underside single colour, upper side four colours), second web from bottom 4 : 1, third web from bottom 4 : 4 and fourth web 4 :4.

For example a printed product / ribbon of four webs, taken successively from bottom to top, having the following colour formats: bottom web 4 : 4 (underside single colour, upper side four colours), second web from bottom 1 : 4, third web from bottom 4 : 1 and fourth web 4 :4.

For example a printed product / ribbon of four webs, taken successively from bottom to top, having the following colour formats: bottom web 4 : 4 (underside single colour, upper side four colours), second web from bottom 1 : 4, third web from bottom 4 : 1 and fourth web 4 :4.

Furthermore a printed product can be produced such that of four adjoining webs after printing on the web to the former folder, three webs are printed multi-colour on both side, particularly four-colour, and the fourth web is printed single colour on both sides.

For example a printed product / ribbon of four webs, taken successively from bottom to top, having the following colour formats: bottom web 4 : 4 (underside single colour, upper side four colours), second web from bottom 1 : 1, third web from bottom 4 : 4 and fourth web 4 :4.

For example a printed product / ribbon of four webs, taken successively from bottom to top, having the following colour formats: bottom web 4 : 4 (underside single colour, upper side four colours), second web from bottom 4 : 4, third web from bottom 1 : 1 and fourth web 4 :4.

The arrangement described for the printing machine, in particular with the six-cylinder printing press 152, permits the variety of production modes described, without requiring installation of inflexible print units. The cylinders of the satellite print units 02 and the six-cylinder printing press 152 can always be driven in the same rotational sense. The gives advantages in respect of the use of minigap technology, i.e. for the narrow opening 28, and in respect of effort required for setting up and starting.

The printing machine is for instance implemented using printing presses that are six page widths wide, in particular in newspaper format. The circumference at least of the form

cylinder 16 corresponds in essentials to the length of two lengths of double printed pages, in particular in newspaper format.

For the cylinders of the three-cylinder printing press 151 the conditions and execution described above for the cylinder 16; 17 should be used.

Code number key

01 Print tower

02 Print unit, satellite print unit, nine-cylinder satellite print unit, ten-cylinder satellite print unit, main print unit

03 Web, partial web

03a Web, partial web

03b Web, partial web

03c Web, partial web

03c1 Web, partial web

03c2 Web, partial web

04 Superstructure

05 -

06 Slitter

07 Turn unit

08 Register control

09 Harp

10 –

11 Folder structure

12 Folder machine

13 Printing machine, offset printing machine

14 Ink train

15 Ink fountain

16 Cylinder, form cylinder

17 Cylinder, transfer cylinder

18 Counter-pressure cylinder, satellite cylinder

19 Lift, printing former, printing plate

20 Dampening system, spray dampening system

21 Lift, rubber blanket, metal printing blanket

22 Coating

23 Carrier plate

24 End, leading, overhang

25 –

26 End, trailing, overhang

27 Channel

28 Opening

29 Clamping piece, clamping element

30 Outer circumference

31 Spring element

32 Actuating mechanism, hollow body, hose

33 Register element

34 Base

35 Register block, register pin

36 Channel

37 Channel

38 Opening, slot

39 Opening, slot

40 Outer circumference

41 Opening, slot

42 Drilled hole

43 Retaining device, clamping piece, clamping element

44 Spring element

45 –

46 Actuating mechanism, hollow body, hose

47 Actuating mechanism, hollow body, hose

48 Actuating mechanism, hollow body, hose

49 Filler element

50 –

51 Opening

52 Actuating mechanism

53 Proof-pulling element, first, roller element, roller

54 Proof-pulling element, second, roller element, roller

55 –

56 Traverse

57 Actuating mechanism, hollow body, hose

58 Actuating mechanism, hollow body, hose

59 –

60 –

61 Drive motor, electric motor

62 Gearbox, reduction gearbox

62 Ancillary transmission gearbox

63 Friction roller

64 Drive motor

65 –

66 Friction roller

67 Drive motor

68 Drive linkage

69 –

70 –

71 Pinion gear

72 Drive gear

73 Drive gear

74 Drive gear

75 –

76 Spigot

77 Drive gear

78 Drive gear

79 Drive gear wheel

80 Drive motor

81 Roller, draw roller

82 Turn bar, guide element

83 Carrier

84 Guide

85 –

86 Roller, guide element

87 Guide

88 Start-up roller, harp roller, cut-off

89 Start-up roller, harp roller, guide element

90 –

91 Register roller

92 Diverter roller

93 Start-up roller, harp roller, register roller, guide element

94 Carrier

95 –

96 Guide

97 Diverter roller

98 –

99 –

100 –

101 Former folder

102 Former folder

103 Former folder

104 Centre slitter

105 –

106 Former folder

107 Former folder

108 Former folder

109 Ribbon

110 –

111 Ribbon

112 Ribbon

113 Ribbon

114 Ribbon

115 –

116 Ribbon

117 Draw roller

118 Former folder feed-in roller

119 Drive motor

120 Drive motor

121 Draw roller

122 Guide roller

123 Transport roller

124 Pair of draw rollers

125 Pair of rollers, draw group, diverter roller

126 Cutter gap

127 Cutter cylinder, two-fold

128 Cutter cylinder, four-fold

129 Retainer, perforation bar, gripper

130 Fold knife

131 Gap

132 Flap fold cylinder

133 Creel (press delivery)

134 Discharge device, conveyor belt

135 Ribbon bundle

136 Drive motor

137 Belt drive

138 Pinion, drive gear

139 Drive motor

140 Pressure roller

141 Drive motor

142 Draw group

143 Pressure element

144 Perforation pins, pins

145 –

146 Pressure element

147 Hole

151 Three-cylinder printing press

152 Six-cylinder printing press

153 Centre / diverter cylinder

A Section

B Section

C Section

D Section

E Section

F Section

A1, A2 Printed side

B1, B2 Printed side

C1, C2 Printed side

D1, D2 Printed side

E1, E2 Printed side

F1, F2 Printed side

B 10 Web

B 20 Web

B 30 Web

B 40 Web

b03 Width, web, web width

b03a Width, partial web

b23 Width (23)

b27 Width (27)

b101 Former folder width

l Length

L16 Length

L17 Length

L82 Length

L86 Length

L88 Length

L93 Length

M Centre plane

MS Material thickness

P Production direction

S Symmetry plane

S16 Slit width

S17 Slit width

U Section

T1 Print tower

T2 Print tower

T3 Print tower

α Angle

β Angle

α Angle